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New York State
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TWENTY-THIRD ANNUAL REPORT

OF THE

State Department of Health

OF

NEW YORK

FOR THE YEAR ENDING DECEMBER 31, 1902

TRANSMITTED TO THE LEGISLATURE, FEBRUARY 2, 1903

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STATE OF NEW YORK.

No. 67

IN ASSEMBLY,

FEBRUARY 2, 1903.

TWENTY-THIRD ANNUAL REPORT

OF THE

STATE DEPARTMENT OF HEALTH.

STATE OF NEW YORK

EXECUTIVE CHAMBER

ALBANY, *February* 2, 1903

To the Legislature:

I have the honor to transmit herewith the twenty-third annual report of the State Department of Health, the same being for the year 1902, with appendices.

B. B. ODELL, JR.

STATE DEPARTMENT OF HEALTH OF NEW YORK.

OFFICERS

DANIEL LEWIS, M. D.	*Commissioner of health*
WILLIAM E. JOHNSON, M. D.	*Secretary*
F. C. CURTIS, M. D.	*Medical expert*
T. A. STUART	*Chief clerk*
F. D. BEAGLE	*Registrar of vital statistics*
GEORGE BLUMER, M. D.	*Director Bureau of pathology and bacteriology*
WILLIS G. TUCKER, M. D.	*Director Bureau of chemistry*
ROSWELL PARK, M. D.	*Director Cancer laboratory*
HERBERT D. PEASE, M. D.	*Director Antitoxin laboratory*
OLIN H. LANDRETH, C. E.	*Consulting engineer*
P. A. CALLEN, M. D.	*Consulting ophthalmologist*

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REPORT

ALBANY, *February* 2, 1903

To His Excellency BENJAMIN B. ODELL, JR., *Governor of the State of New York:*

Sir — The State Department of Health submits to you its twenty-third annual report, in accordance with the provisions of section 12 of the Public Health Law.

SANITARY CONDITION OF THE STATE

The general sanitary condition of the state when compared with the reports for former years is satisfactory. The total number of deaths reported during the year was 124,160, making a death rate of 17 per thousand population. This is the average death rate for the five preceding years, but is about 5000 less than the mortality for 1901.

One satisfactory feature appears in the report of deaths occurring under five years of age which shows a total of 5000 less than the average, this saving having chiefly occurred in the rural parts of the state.

The mortality from preventable diseases was 14 per cent of the total which was above the average of preceding years. This increase was due to a considerable extent to the continued prevalence of smallpox in various portions of the state, which disease caused a total of 442 deaths for the year.

Typhoid fever was the cause of 1318 deaths, which was over 300 less than the annual average for the past five years. The deaths from pulmonary consumption were 12,582, which shows a decided decrease from preceding years, the average for the past five years having been 13,270. This gratifying decrease in the death rate from pulmonary consumption is believed to be largely due to the measures for prevention which are being more thoroughly understood by the public at large, as well as the medical practitioners who have charge of these cases in their incipient stage.

In 1901 this Department decided upon taking a census of the cases of consumption then existing in the state. In doing so, two things were sought to be established. First, a reliable basis upon which to calculate the actual mortality of the disease which might ultimately aid in establishing the fact of the efficiency of modern methods in its treatment. Second, in view of the fact that the state has undertaken to a very limited extent the care of consumptives, it seemed desirable to see to what extent the resources of the state might be taxed in case a general plan of state care for consumptives should be demanded as is now the case in regard to the state care and control of lunatics.

The plan adopted for taking the census was the asking of a report from every practitioner of medicine in the state as to the number of cases of consumption under his professional care upon a certain date. The results of this investigation appear in detail in another part of this report. In general terms it appears that the number of cases was 16,513, which is somewhat in excess of the mortality from the disease during the same year, but the two totals differ by only 3931. This seems to indicate, as stated above, that the reduction in the death rate from this disease is not due to results of treatment and attempts to cure the disease, but rather to the fact that prophylactic measures have resulted in a decided check to the spread of the disease which is now known and recognized as being due to infection.

In so far as the state hospital for consumptives which is now being located at Ray Brook in the Adirondacks serves as a source of information to the inmates, and consequently to the public at large, as to the necessary precautions against infection from personal association with those affected with the disease, it will be of the greatest possible importance to the entire people of the state; it will also be the means of demonstrating the possibilities of cure in the early stages of the disease.

The somewhat general prevalence of the epidemic of smallpox which prevailed during 1901 and continued to about the same extent during the past year, has brought into prominence the prophylactic value of vaccination, for our reports of cases show that nearly all the reported cases of smallpox occurred in persons who were either unvaccinated or had not been vaccinated since childhood.

The necessity for authority to order a general vaccination when necessary for the protection of a community has also been made very apparent during the prevalence of this entire epidemic. It is doubtless true that a so-called compulsory vaccination law would not meet with universal public approval, but an amendment to the Public health law has been submitted to the legislature, providing that a local board of health shall enforce general vaccination of all persons when required to do so by the State Commissioner of Health, who is authorized by this amendment to make such a requirement when in his judgment such action is necessary for the protection of the public health. This proposed amendment is of great importance, and should be enacted into law. Had such a provision already existed upon the statute books, many communities could have been saved from extensive epidemics had such a vaccination order been issued and executed when the first case appeared.

THE PROTECTION OF POTABLE WATERS

The protection of the sources of the water supplies of the various municipalities of the state is one of the most important functions delegated to the Department under the Public health law. Such protection against pollution of the water supplies bears directly and emphatically upon the general sanitary condition of the state. It is well recognized that many diseases may be communicated through drinking water, the most notable example of which is typhoid fever. Reference has just been made to the fact that 1318 deaths from typhoid fever occurred in the state during the past year. It is fair to state that each one of these deaths was the result of neglect to supply pure water, and that nearly if not all of them could have been prevented if the recognized requirements for the protection of water supplies had been in operation in every instance.

Under the law now in force, rules for the protection of water supplies may be formulated by the State Department of Health upon application by the municipality using the water by the company supplying it, or by an individual. It is the custom of the Department to make such rules sufficiently comprehensive to prevent all contamination of a dangerous or doubtful character. When such rules are approved by the state commissioner of health, and published for six weeks in a newspaper in the county or counties in which the watershed is located, they have all the force of law, and prosecutions may be made against offenders and penalties imposed. In other words, these rules are capable of thorough enforcement.

It is a source of surprise and regret to your commissioner of health that every municipality with a general water supply has not availed itself of this simple and effective way of securing pure water. It is a notorious fact that epidemics have occurred in the state attended by numerous fatalities which never could have occurred had this protection been secured which the state has now provided for many years.

As a very general pollution of the water courses and bodies of water throughout the state was believed to exist, the Department undertook an inspection of a large number at widely separated points in the state during the past year, and secured evidence of the very general neglect to protect the purity of these various water supplies. The necessity for immediate and general legislation which shall at least prevent an increase of these contaminations, seems to be a public necessity. To meet this necessity a bill for the prevention of the pollution of fresh waters of the state by limiting or absolutely preventing the discharge of untreated sewage and other refuse or waste matters, has been prepared and introduced in the legislature. The passage of this act, with such modifications as the experience of the members of the legislature may suggest, would be one of the most far-reaching advances in public sanitation in this state which has been passed for many years, and would result in the prevention of future epidemics and the saving of the lives of many citizens.

A review of some of the evidences of pollution of the waters of the state secured during the investigation above referred to has been prepared by Prof. O. H. Landreth, the consulting engineer of the Department, and is embodied in the appendix of this report.

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It may be stated here that only three applications were received during the year for the formulation of rules to protect water supplies, these applications coming from Cornell University, Middleville and Pleasantville.

Alleged violations of rules already in force have been received and investigated from Mount Kisco; Peekskill; Rome; White Plains; New York city, Borough of Brooklyn; Syracuse, and Skaneateles.

INVESTIGATIONS ORDERED BY THE GOVERNOR

Two complaints have been referred to the Department for investigation by the governor, as provided by section 6, article I of the Public health law. One related to the alleged unsanitary condition of the Soldiers' Home at Bath, and the other a complaint against the Farmers' Fertilizer and Chemical Company at East Syracuse, in the town of De Witt. The reports of these investigations have already been transmitted to you as required by law.

NUISANCES

Alleged nuisances of various kinds have been reported which have been investigated and in many cases abated through the mediation of this Department. It should be stated, however, in this connection, that in nearly every instance these complaints against nuisances are such as properly belong under the jurisdiction of the local boards of health, who should make such investigations and secure abatement of the nuisances when found, without occupying the time and attention of the State Department. The law evidently contemplates interference by the State Department in such cases if the local board fails to act upon the complaint, the implication being that the local health authorities have failed in their duty whenever such complaints are allowed to reach the office of the State Department.

ANNUAL CONFERENCE OF SANITARY OFFICERS

One of the objects in view when establishing the annual conference of sanitary officers was the discussion of the duties and prerogatives belonging to local health officers, not only in cases of nuisances above referred to, but in the management of epidemics of contagious and infectious diseases, problems of drainage, water supplies, and all other matters relating to the public health of the various sanitary districts. The attendance of health officers and registrars at the conference of last year was larger than the preceding one, and these annual meetings which may be termed schools of instruction, have proven of great value to the health officers themselves, and decidedly advantageous to the State Department. The reports of births, deaths and marriages by the registrars have been much more promptly filed, more carefully prepared, and consequently of greater value as permanent records. This fact alone is of sufficient importance to warrant the institution of the conference. The information imparted by sanitary authorities of eminence, by sanitary engineers and medical experts in contagious and infectious diseases are of great value to the health officers throughout the state, and the average efficiency of the sanitary work done has evidently been greatly improved.

THE LABORATORIES OF THE DEPARTMENT

The Cancer laboratory of the Department, which is located in Buffalo, deserves more than a passing notice in this report. Through the liberality of the citizens of Buffalo a very excellent building has been erected for the laboratory, and the investigation of the great questions relating to the causation, distribution and treatment of cancerous diseases has been steadily carried forward during the year. In my judgment no more important question is now the subject of discussion in the scientific world than the origin of cancer. Germany has a laboratory devoted to such study, and during the year another laboratory for the study of cancer has been established in Great Britain. Our laboratory having been established earlier than either of these, and with its present splendid equipment for research, is easily the leader in this department of study, and it is fair to assume that the work started here may yet result in untold benefit.

The report of the director of the laboratory is of such interest that I beg to recommend that copies should be ordered published by the Legislature for distribution to scientists and institutions as desired by them.

ANTITOXIN LABORATORY

The work of the Antitoxin laboratory, auspiciously inaugurated last year, has developed into very gratifying usefulness. The demands made upon the laboratory, for diphtheria antitoxin especially, have steadily increased since the distribution began in March. Applications for both diphtheria and tetanus antitoxins have been received from an average of six health officers located in every county of the state, outside of those comprising New York city. This widespread distribution insures the prompt treatment of the proper cases, even if located in the most inaccessible parts of the state. Heretofore the smaller towns and villages have been without any supplies of diphtheria antitoxin, and but few places of any size in the state have had any tetanus antitoxin whatever.

The lack of these supplies had frequently resulted not only in the death of numbers of cases, but had permitted the development of epidemics of diphtheria which can now be readily prevented by the free use of preventive injections of immunizing doses of the diphtheria remedy. These facts have been amply demonstrated by the extensive experiences which several of the largest state charitable institutions and a large number of smaller private charities have had with the laboratory's product during the past year. The report of the director of the laboratory in the appendix shows that especially valuable work has been accomplished in the Utica and Willard state hospitals with the antitoxin furnished by this Department.

The high cost of diphtheria antitoxin from commercial producers has very generally resulted in the past in the use of none or altogether too small amounts where it was most needed. This has not only been the case in the treatment of the poor, but in many instances has prevented the necessarily extensive use of the remedy in institutions. The distribution by this Department of unlimited amounts of the best quality of antitoxin has therefore not only been a great financial saving to those municipalities and state institutions formerly purchasing what was absolutely necessary for charitable use, but by its free and unlimited character has permitted the prompt and continuous treatment of individual cases or epidemics, thus preventing large numbers of persons from infection and saving many valuable lives.

In this way the work of the laboratory will also exercise an important educational function in that the improved results to be obtained from the prompt use of large doses, frequently repeated, will become more generally known and appreciated.

The testing of the character and strength of antitoxins distributed by commercial institutions has been inaugurated, and will act as a safeguard against the sale of any such which may be improperly prepared, or which are not as strong as claimed by their producers.

This laboratory must be considered as one of the most important additions to the list of state institutions devoted to the prevention and treatment of disease.

BUREAU OF PATHOLOGY AND BACTERIOLOGY

The establishment of this new department of our work by the legislature in 1902 has been amply justified by the results thus far attained. One of the most important duties of this bureau is the bacteriological examination of samples of potable water furnished by the local health officers throughout the state, which examinations are made without charge to the municipality. The applications for these examinations are becoming more and more numerous as their value becomes appreciated by the towns and villages having a water supply. It is fair to state that if every water supply throughout the state were regularly examined, and the results published, the security thereby given those whose sources of supply are satisfactory, and the warning of danger in cases where greater protection and purification are called for, would be a great advance in preventive medicine over existing conditions. Where facilities are at hand within any given municipality, such work is not a proper one for the State Department to undertake; but in all other instances it comes clearly within the province of the duties which the state has imposed upon the Commissioner of Health.

The above remarks relating to the examination of water may properly be repeated concerning the tests for the presence of germs of diphtheria and the test for typhoid fever. We have steadily recommended to health officers that cultures of secretions from the throats of diphtheria patients should be made—especially in the case of children before their return to school. It has been shown that a neglect of this precaution has often been the means of continuing an epidemic which might otherwise have been absolutely arrested. Lives have doubtless been sacrificed by a neglect of this recognized means of determining when the quarantine of a diphtheria case should be terminated.

Dr. Blumer, who is in charge of this Bureau, has called for more assistance in order to meet the demands upon him, and a small additional appropriation is recommended to meet this necessity. As the advantages which this Bureau of the Department affords to the local health authorities throughout the state will certainly result in a steady increase of the demand for such service, it is clearly the duty of the state to meet the demand.

BUREAU OF CHEMISTRY

The chemical work of the Department has been continued under the directorship of Professor Willis G. Tucker, who has been in charge of this line of investigations ever since the original Board of Health was established, in 1880.

All samples of potable water presented for examination require a chemical examination as well as the application of the bacteriological tests—although neither one alone is sufficient to establish the absolute purity of water. In addition to this the law requires the Department of Health to make tests of food and drugs, as a means of securing purity of these important products. To meet all the calls which are made for such examinations of both food and drugs would require some additional appropriation from the legislature. We believe that such work naturally belongs to the Health Department—where the law has placed it, and would suggest that the legislature place an additional item of $1,000 (one thousand dollars) in the Supply bill for the thorough execution of the law concerning these adulterations. It has heretofore seemed essential that there should be a regularly appointed collector of samples of food and drugs for analysis. Such work could very properly be delegated to the local health officer throughout the state, and if the proposition to have a health officer appointed by the State Department should be adopted, such officer would be more thoroughly in harmony with the plan of such examinations, and could more properly be requested to perform such duties in the interest of public health than at present.

A more general test of illuminating oils should also be made by the Bureau of chemistry, in compliance with chapter 376 of the laws of 1896, which calls for such examinations. The importance of this testing of illuminating oils as a public health measure may be readily appreciated by reference to the large number of accidents—many of them resulting fatally—which have occurred and are constantly occurring from the explosion of oil lamps and oil cans, the contents of which when tested have been shown to be below the standard or flash point required by the standard authorities. Of a considerable number of samples of illuminating oil examined during the year the majority showed the flash point to be below the safety point. Notice was served upon the parties selling such oils, who promised to rectify this serious defect, and subsequent tests of the same oil, made by this Department, showed that the law had been complied with by these dealers.

To ensure a universal compliance with this requirement, however, and absolute protection of the lives of the people against the explosion of oil at a moderate temperature, a considerable increase in the amount of work done should be undertaken and continued regularly.

It is possible that by the employment of a health officer for collecting samples, as suggested in the matter of food and drugs, that the $1,000 referred to above might be sufficient for the coming year.

Careful attention is called to the full report of the chemist, which appears in the appendix of this report.

In conclusion, permit me to call attention to the largely increased demands which the public now makes upon the State Department of Health, as compared with the conditions as they existed only a few years ago; and also to the fact that the appropriations for carrying on the various duties which the law has imposed on the Department have not kept pace with the present requirements. In matters which concern life and health there should practically be no abridgment of the work for lack of funds. The duties of the State Department and of local boards of health are separated by a clear line of demarcation, which it is believed should not be changed. The construction of sewers and disposal works, plans for which have been approved by the engineers of this Department, should be inspected during the course of construction and afterwards by a competent officer. When rules have been formulated by the State Department for the protection of a watershed, it is essential that a state officer should inspect these watersheds at regular intervals, to see that the rules are being properly obeyed. While it is the duty of the local authorities to make such inspections, it is as true in public health matters as in every other that an intelligent supervision often secures better service.

This Department, while it is doing excellent work, could greatly increase the efficiency of its operations by sufficient money to provide for what are now recognized to be necessary adjuncts to a successful sanitary administration.

APPENDIX

TWENTY-THIRD ANNUAL REPORT

OF THE

State Department of Health

Financial Report from October 1, 1901, to October 1, 1902

SALARIES

Commissioner of health	$3,500 00
Secretary	2,500 00
Chief clerk	2,400 00
Medical expert	1,500 00
Registrar of vital statistics	1,500 00
Bacteriologist	1,400 00
Stenographer	1,000 00
Six clerks	7,000 00
	$20,800 00

OFFICE EXPENSES

1901			
Oct.	1.	O. A. Quayle	$323 43
		O. A. Quayle	228 39
		O. A. Quayle	173 96
	5.	National Press Intelligence Co	10 85
		G. A. Birch	2 90
		Wyckoff, Seamans & Benedict	75
		Western Union Telegraph Co	3 00
		Western Union Telegraph Co	8 63
	17.	Hudson River Telephone Co	15 75
	26.	O. A. Quayle	76 82
	31.	G. A. Mun & Parsons	45 00
		G. A. Birch	3 15
		Postal Telegraph and Cable Co	25
		National Press Intelligence Co	4 20
		Western Union Telegraph Co	12 71
Nov.	6.	Lang Stamp Works	10 25

1901			
Nov.	15.	Hudson River Telephone Co.	$4 35
		Hudson River Telephone Co.	22 90
		Lemcke & Beuchner	4 00
	30.	O. A. Quayle	1,265 89
		H. F. Prescott	5 00
		G. A. Birch	3 05
Dec.	1.	J. G. Myers Estate	11 30
		Hudson River Telephone Co	23 50
		Western Union Telegraph Co	7 85
		Postal Telegraph and Cable Co	49
	19.	Engineering News	5 00
	31.	G. A. Birch	3 05
1902			
Jan.	3.	P. J. Henzel	1 50
		Western Union Telegraph Co	3 00
		Western Union Telegraph Co	3 68
		Postal Telegraph and Cable Co	1 58
		Lang Stamp Works	1 25
		Harry W. Riggs	4 00
	8.	Hudson River Telephone Co	17 54
	21.	George Spalt	12 00
	30.	H. F. Prescott	5 00
		Albany Medical Annals	1 00
	31.	H. F. Prescott	5 00
Feb.	4.	Postal Telegraph and Cable Co	92
		O. A. Quayle	93 94
		O. A. Quayle	185 00
		G. A. Birch	3 15
		Western Union Telegraph Co	10 10
	21.	Hudson River Telephone Co	19 27
		The Sanitarian	4 00
March	6.	E. A. Carroll	3 00
		Rufus K. Palmer	3 00
		O. A. Quayle	246 12
		H. F. Prescott	5 00
		Capital City News Co	6 00
		G. A. Birch	2 80

1902				
March	14.	Engineering Record	$5	00
		Postal Telegraph and Cable Co		60
		Western Union Telegraph Co	24	77
		Wagner Typewriter Co	6	50
		Hudson River Telephone Co	21	10
	18.	Chas. E. Thompson	5	00
	27.	O. A. Quayle	376	27
	31.	G. A. Birch	3	00
April	14.	Conference of State and Prov. Boards of Health	10	00
		H. F. Prescott	5	00
		Postal Telegraph and Cable Co	1	25
		Western Union Telegraph Co	24	07
		Lang Stamp Works		50
		Hudson River Telephone Co	20	85
		Western Union Telegraph Co	3	00
		Hudson River Telephone Co	16	55
		Postal Telegraph and Cable Co	2	01
		H. F. Prescott	5	00
		G. A. Birch	3	05
	20.	Munson Supply Co	5	00
		P. J. Henzel	8	00
		Lang Stamp Works		50
		Hudson River Telephone Co	17	30
	31.	G. A. Birch	2	95
June	9.	H. F. Prescott	5	00
		Postal Telegraph and Cable Co		60
		Western Union Telegraph Co	4	64
	14.	Hudson River Telephone Co	15	10
	27.	Sampson, Murdock & Co	3	00
			$3,509	88

TRAVELING EXPENSES

1901				
Oct.	17.	W. E. Johnson	$99	34
		T. A. Stuart	18	00
	26.	B. T. Smelzer	6	61

1901				
Nov.	6.	B. T. Smelzer	$4	88
		T. A. Stuart	14	61
Dec.	11.	B. T. Smelzer	13	50
		W. E. Johnson	61	51
	31.	O. H. Landreth	94	75
1902				
Feb.	4.	F. C. Curtis	50	62
	5.	W. E. Johnson	79	74
March	6.	W. E. Johnson	72	32
	27.	C. W. Adams	22	30
		Jno. P. Martin	7	12
		H. D. Pease	36	65
	31.	W. E. Johnson	61	01
April	22.	T. A. Stuart	23	01
May	6.	Jno. Thompson	265	37
		W. E. Johnson	57	13
	20.	F. D. Beagle	12	78
	31.	T. A. Stuart	26	62
		W. E. Johnson	46	33
June	25.	C. E. Thompson	3	02
		F. C. Curtis	47	87
	27.	W. B. Landreth	8	00
		F. D. Beagle	10	69
July	1.	W. G. Tucker	38	07
	8.	W. E. Johnson	93	32
		O. H. Landreth	95	99
	23.	J. P. Martin	26	80
		T. A. Stuart	54	25
		F. D. Beagle	21	83
	31.	W. B. Landreth	15	76
		Jno. Thompson	120	69
Aug.	11.	T. A. Stuart	50	11
	18.	W. E. Johnson	103	90
		H. W. Carey	46	34
	30.	H. D. Pease	19	74
		H. W. Carey	33	89

1902			
Aug.	30.	Geo. G. Champlin	$37 47
		Chas. E. Thompson	22 62
Sept.	4.	W. E. Johnson	75 25
	6.	T. A. Stuart	27 49
	19.	F. D. Beagle	31 37
		Commissioner's traveling expenses	1,031 39
			$3,090 06

INVESTIGATIONS

1901			
Oct.	1.	W. G. Tucker	$215 00
	26.	Danker	5 00
		Whitehead & Hoag Co	42 88
		B. T. Smelzer	30 00
	28.	Cora B. Partridge	50 00
Nov.	6.	B. T. Smelzer	15 00
		Conference of sanitary officers	458 95
	9.	Postage stamps	150 00
	30.	Cora B. Partridge	50 00
		W. M. Thomas	216 00
		W. G. Tucker	280 00
Dec.	11.	W. F. Antemann & Son	25 00
		B. T. Smelzer	30 00
	18.	Cora B. Partridge	50 00
	23.	O. A. Quayle	452 08
	26.	Postage stamps	200 00
	31.	O. H. Landreth	400 00
1902			
Jan.	31.	Cora B. Partridge	50 00
		O. A. Quayle	21 16
Feb.	4.	F. C. Curtis	40 00
	21.	Cora B. Partridge	50 00
March	6.	W. G. Tucker	105 00
		O. A. Quayle	9 75
	31.	Cora B. Partridge	50 00
		J. P. Martin	80 80

1902			
March	31.	C. W. Adams	$55 00
April	30.	Cora B. Partridge	50 00
		O. A. Quayle	466 45
		Bausch & Lamb	55 10
		U. S. Mailing Case Co	16 10
		F. M. West	17 40
May	1.	Bausch & Lamb	35 85
	6.	Western Union Telegraph Co	32 45
		W. G. Tucker	120 00
	31.	Cora B. Partridge	50 00
		F. D. Beagle	1 25
		W. G. Tucker	247 38
June	25.	F. C. Curtis	50 00
		Brown & Stuart	175 00
July	1.	W. G. Tucker	175 45
	8.	O. H. Landreth	835 00
	23.	J. P. Martin	63 00
		Klips	5 00
Aug.	31.	Geo. G. Champlin	4 38
		Chas. E. Thompson	12 94
Sept.	19.	W. G. Tucker	150 65
			$5,695 02

POSTAGE AND EXPRESSAGE

Postage	$750 04
Expressage	1,302 25
	$2,052 29

Smallpox, town of Altamont	$2,744 30

CANCER LABORATORY

1901			
Oct.	10.	H. R. Gaylord (salary, August and September)	$500 00
	17.	Roswell Park, sundry accounts	111 35

1901				
Oct.	26.	October pay-roll	$641	33
Nov.	21.	Roswell Park, sundry accounts	49	69
	30.	November pay-roll	736	66
Dec.	23.	December pay-roll	676	66
		Roswell Park, sundry accounts	268	66
1902				
Jan.	31.	January pay-roll	676	66
		Roswell Park, sundry accounts	105	70
Feb.	4.	Irving P. Lyon	103	98
		Eimer & Amend	454	23
	21.	February pay-roll	736	66
		Roswell Park, sundry accounts	115	27
March	14.	Eimer & Amend	30	44
	27.	Roswell Park, sundry accounts	531	72
		March pay-roll	746	66
April	30.	April pay-roll	878	36
		Roswell Park, sundry accounts	446	87
May	26.	May pay-roll	869	99
		Roswell Park, sundry accounts	377	47
June	30.	June pay-roll	869	99
		Roswell Park, sundry accounts	306	06
July	31.	July pay-roll	786	66
		Roswell Park, sundry accounts	196	10
Aug.	18.	Roswell Park, sundry accounts	303	52
	28.	August pay-roll	786	66
Sept.	30.	Roswell Park, sundry accounts	659	70
		September pay-roll	553	33
			$13,520	38

ANTITOXIN LABORATORY

1901				
Oct.	17.	W. S. Douglass, purchase of stable	$2,980	98
	1–31.	Sundry accounts	1,133	33
		Pay-roll, October	316	66
Nov.	30.	Pay-roll, November	316	66
		Gick & Sayles, remodeling stable	2,868	43

1901			
Nov.	30.	Sundry accounts	$828 99
Dec.	11–31.	Sundry accounts	1,513 15
		Pay-roll, December	316 77
1902			
Jan.	15.	Rent of Laboratory	1,000 00
	3–31.	Sundry accounts	359 82
		Pay-roll, January	623 32
Feb.	28.	Pay-roll, February	418 32
	4–21.	Sundry accounts	695 11
March	6–27.	Sundry accounts	728 16
	28.	Pay-roll, March	431 34
April	30.	Pay-roll, April	431 32
	5–30.	Sundry accounts	757 13
May	6–31.	Sundry accounts	611 46
		Pay-roll, May	431 32
June	9–30.	Sundry accounts	411 51
		Pay-roll, June	431 32
July	8–31.	Sundry accounts	562 22
		Pay-roll, July	606 32
Aug.	11–31.	Sundry accounts	302 79
		Pay-roll, August	606 32
Sept.	4–30.	Sundry accounts	135 40
			$19,818 15

PLANS

FOR

SYSTEMS OF SEWERAGE

AND

SEWAGE DISPOSAL

APPROVED DURING 1902

BATAVIA, N. Y.

Amended plans for sewage disposal

Plans for an original and complete system of sewerage for this village were approved by the State Board of Health on March 8, 1895, and appeared in the 16th annual report of the Board.

On August 1, 1902, the State commissioner of health approved a set of amended detailed plans for a sewage purification plant, employing septic tank treatment followed by either intermittent sand filtration or contact bed treatment, whichever might be found most economical after receiving bids.

These plans comprise a report by Mr. Glenn D. Holmes, civil engineer, made to the board of sewer commissioners of Batavia, dated July 11, 1902, and hereto appended together with eight plates of drawings which appear in this report as follows:

Plate 1. General plan for sand filtration, forming Plate I of this report.

Plate 2. Design for septic tank, forming Plate II of this report.

Plate 3. General plan for rapid sand filters, forming Plate III of this report.

Plate 4. Sections of filters, forming Plate IV of this report.

Plate 5. Plan of dosing tank and apparatus, forming Plate V of this report.

Plate 6. General plan of septic tanks and contact beds, forming Plate VI of this report.

Plate 7. Plan of contact beds, forming Plate VII of this report.

Plate 8. Plan of contact bed showing regulating apparatus, forming Plate VIII of this report.

REPORT MADE TO THE BOARD OF SEWER COMMISSIONERS ON THE PURIFICATION OF THE SEWAGE OF THE VILLAGE OF BATAVIA, N. Y., 1902

[By GLENN D. HOLMES, *Civil Engineer*]

To the Honorable the Board of Sewer Commissioners of Batavia, N. Y.:

In accordance with your request the undersigned herewith presents his report on the purification of the sewage of the village of Batavia.

Batavia, with its population of nearly 10,000 people, is spread over an area of some 2000 acres, probably 90 per cent of the inhabitants are living within the central half of this area in dwellings mostly separated and set well back from the street and surrounded by spacious grounds. No district is densely populated. The industries of the village produce quite a variety of manufactured articles, but none of them are of a nature to contribute strong sewage. Considerable ground water is expected to find its way into the sewers during the greater part of the year, and in view of the foregoing facts it is safe to assume, in planning for the purification works, that the sewage to be dealt with will be weak and dilute in character.

AMOUNT OF SEWAGE

The quantity of sewage for which provision must be made in designing the disposal plant may be estimated from the water consumption, taking into consideration that during a portion of the year a material increase in the volume may be expected as infiltration from ground water flow, while in the warmer summer months a decrease will be noticeable due to the evaporation of water used in sprinkling streets and lawns.

In the report recently made you by the undersigned on the "Cost of Pumping Sewage into Tonawanda Creek," an estimate for present requirements placed the amount of sewage at 865,000 gallons per day. This estimate was based on a water consumption of 75 gallons per capita, and assumes that about one-half of the present population will soon have sewer connections. Infiltration is also included at the rate of 25,000 gallons per mile per day for the sewers contemplated in the near future. Appendix table 2, gives a record of the water pumped for the year 1900 by the Batavia water works. Table 3 records the amount of infiltration measured in several sewerage systems.

COMPOSITION OF SEWAGE

Sewage of ordinary dilution is made up of about two parts of solids per 1000, and the remaining 998 are pure water. One-half of these solids is mineral matter, of which we may have no fear, the other half or remaining one part in one thousand is composed of organic compounds which may become not only offensive, but dangerous as well. This organic portion is made up of both animal and vegetable tissues, the former consisting of nitrogenous compounds which rapidly undergo decay by putrefaction and give off offensive odors whenever the supply of oxygen is insufficient. The vegetable matter is of a more stable nature, decomposing less rapidly and emitting less disagreeable odors.

During the last few years the purification of sewage has received a great deal of attention, and much valuable information is now available regarding the different methods of disposal.

DILUTION WITH A LARGE VOLUME OF WATER

Sewage, when discharged into a body of water, will disappear to sight and smell, providing the body of water is large enough to form a sufficient dilution. This, however, can hardly be classed as purification. From observations of American rivers, made under the direction of the Massachusetts board of health, Rudolph Hering, one of our most eminent sanitary engineers, finds an offense is almost sure to arise when the flow of the stream is less than two and one-half cubic feet per second per one thousand persons, and when a flow of seven cubic feet per second per one thousand persons can be had there is no danger of creating a nuisance. The gauging of Tonawanda creek, made after a protracted period of drought in September of 1894, gave a flow of 8.424 cubic feet per second, from which it is seen that the dry weather flow of the creek will not safely care for the sewage of more than 1200 people, and an offense would in all probability arise from a population of 3300. The last enumeration of the village, January, 1902, gave the population as 9337, which is already about three times that which would surely cause offense, and eight times that which might safely dispose of its sewage directly into the creek without purification. Tonawanda creek being larger than any other stream in this locality, it is plainly evident that purification of Batavia's sewage is imperative at any outlet chosen.

CHEMICAL PRECIPITATION

Chemical precipitation, which at one time had many advocates, has grown into less favor; it is expensive both as to first cost and for maintenance. This process of purification aims to remove the solids held in suspension by the addition to the raw sewage, of suitable chemicals, such as lime, sulphate of alumina, ferrous or ferric salts. It is usual to provide tanks of a capacity sufficient to hold about one-half day's dry weather flow, and some automatic device to regulate the amount of precipitating chemical. The solids accumulate in the bottom of the tank in the form of sludge, and, unless removed at frequent intervals, putrefy and create a nuisance. From 80 per cent to 95 per cent of the suspended matters are removed from the raw sewage by this process, and about one-half of the total organic matter, but there still remains the sludge, for the removal of which it is necessary to provide. It was the hope of the advocates of this system that some means would be discovered by which the manurial value of the sewage could be made to offset the cost of maintenance, but thus far it has always cost more to prepare the sludge in a commercial form than could be realized from its sale.

BROAD IRRIGATION

The application of sewage to land under cultivation has been more or less successful where climatic conditions were not unfavorable and where the soil is light and porous. The farming lands which may be reached by a gravity outlet sewer from the village of Batavia are not well adapted to this method of disposal, inasmuch as they are mostly clay soil and would permit of the application of only a small amount of sewage without becoming overloaded.

INTERMITTENT AND RAPID SAND FILTRATION

The most successful method of sewage purification, both in this country and abroad, is intermittent filtration. One of the early methods advocated for the purification of sewage was the filtering through beds of sand and gravel to remove the suspended matter. It was soon found that much of the dissolved organic matter was removed as well, a result which is now known to be brought about by the work of bacteria in the filtering medium. The outcome of investigations along this line has proven the bacterial action of such importance that special care is now taken to propagate and stimulate the bacterial life in the filter beds, and the purely mechanical operation as a strainer is considered of minor importance.

All sewage contains an enormous quantity of microscopic organisms known as microbes or bacteria which vary greatly in their characteristics, depending upon the nature and quality of the sewage. These bacteria are divided into two general classes, aerobic and anaerobic, according as they require light and air or the absence of it for their existence. Those living without air are known as anaerobic, and it is this species which aids putrefaction and accomplishes the liquefaction of the organic matter. Aerobic bacteria require oxygen for their existence, they attain their greatest activity only in the presence of light and air, and they feed only on a dissolved organic matter. The division between the two classes is not sharply drawn. Some bacteria, known as faculative, possess both aerobic and anaerobic characteristics.

With sand filters the best effluent is obtained by working the beds intermittently and by applying the desired quantity of sewage quickly and in sufficient volume to flood the whole surface. The sewage then sinks slowly into the bed, driving out the foul air through the underdrains and drawing in a supply of fresh air to oxidize the stranded impurities. In order that the beds may be worked in this manner the sewage is conducted to a regulating or dosing chamber, designed to contain the desired volume for dosing the beds, and when the chamber is filled an attendant or some automatic device releases the sewage and allows it to flow to one of the filter beds.

In order that filtration may be carried on at high rates it is necessary to remove as much of the suspended matter as possible from the raw sewage before applying to the beds. Sand filters which will not treat successfully more than 125,000 gallons of crude sewage per acre per day will care for 500,000 to 1,000,000 gallons of sewage after the suspended matter has been removed. The precipitation of the solid matter either with or without the admixture of chemicals is of great advantage, but the septic tank system has lately been receiving much attention, as it works a material degree of purification in addition to the removal of the suspended impurities.

SEPTIC TANK

The septic tank method of reduction consists in conducting the sewage through a long tank, the dimensions of which are so designed that the sewage in passing shall have a small velocity and will be retained in the tank for a considerable period. On entering the tank, the velocity being retarded, the heavier particles gradually settle to the bottom, while the lighter fatty matters float on the surface and form a leathery scum in which the bacterial life is especially active. The outlet of the tank being placed at some distance below the surface, and at the far end from the inlet, the effluent contains little suspended matter. In the tank the reduction of the organic matter is accomplished by the anaerobic bacteria breaking up the unstable compounds into liquids and gases while the mineral matter is precipitated to the bottom as an inert and inoffensive deposit.

Much experimental work with this process has been done both in this country and abroad, and the best rate of flow, or the time of stalling in the septic tank, has been found to vary from two to thirty-six hours, depending upon the condition and characteristics of the sewage. In England, where the water consumption is much smaller than in the United States, and where the onducive to best results.

ler to aid the growth of anaerobic bacteria and to pre-
dissemination of odors, it was supposed that the septic
uld be constructed both light and air tight, more recent
ion, however, would tend to show no advantage in this
onstruction, but that warmly constructed buildings, well
d, are favorable to best results. While the work of the
nk is regarded mainly as a preparatory step in the purifi-
f sewage, in that its chief function is the reduction of
d matters, it should be noted that a considerable degree
cation is effected as well. The analysis of sewage at
urification plants, and the degree of purification accom-
y the septic tank, is tabulated in table 4 of the appendix.

CONTACT BEDS

intermittent filtration is impracticable on account of
re of the soil, or where the expense of constructing arti-
d filters is prohibitory, the use of contact beds has been
give very satisfactory results. Contact beds are in
oarse-grained filters, in which the outlets can be closed
retain the sewage in " contact " with the filtering medium
ng a period as desired. Cinders, slag, coke and broken

fied sewage should be applied to the contact beds, and that best results are obtained with a septic tank effluent.

Each contact bed is usually designed of a sufficient size to hold about one hour's flow, two hours are allowed for standing full, one hour again for emptying and four hours resting; this allows three fillings per day. When, however, the purification is insufficient, the rest period is extended and the number of fillings made less. The depth of the beds has been made as great as twelve or fourteen feet, but difficulty is experienced in aerating these beds and preventing their gradual choking. The greatest efficient depth does not exceed four feet. When contact beds are supplied with sewage which has been previously treated by the septic tank it may be assumed that the normal working capacity of the bed is one-third the total volume. For beds four feet deep and three fillings per day the purification would be at the rate of 1,303,315 pallons per acre per day. Where a high degree of purification is essential it is necessary to use double contact beds, in which case the second contact beds are constructed of finer material. The degree of purification effected by single contact beds, while not as great as that of sand filters, is usually sufficient, especially if the sewage is dilute. Table 5 of the appendix shows the purification attained at several purification plants by contact beds together with septic tanks.

CHOICE OF PLAN OF DISPOSAL

A careful examination of the lands which are accessible to the gravity outlet sewer has been made by sinking test pits, and the soil was found to contain too large a percentage of clay to permit its use as a filtering material, and purification by broad irrigation or by intermittent filtration is therefore not practicable.

Sand of a suitable quality for the purpose of rapid filtration can be procured from distant localities at a price which makes its use feasible, or broken stone may be obtained at a reasonable cost for the filtering medium of contact beds. Each plan possesses certain advantages, and for this reason we have made detailed plans and estimates for both sand filters and contact beds, ire submitted herewith. The cost of construction makes able to use as small area of beds as possible and to work s at the highest permissible rate without allowing them ne choked or "sewage sick." It is therefore advantageous nomical to first treat the sewage to septic action, thereby ıg the greater part of the suspended matters, liquefying f the organic matter and changing the character of the to a form in which the further purification by oxidation rification can most easily be accomplished.

DETRITUS CHAMBER

ous to stalling in the septic tanks, provision is made for the sewage through a small detritus chamber (plates 1, 5) about twelve feet by two feet by three feet deep in creens are provided to remove the floating matter. The in this chamber being much smaller than in the outlet the coarser suspended matter will be precipitated, the l of which from the chamber is provided for by a sump to the sludge ditch. For convenience in cleaning, the ı chamber is planned to be constructed in duplicate, and ed the flow may be passed simultaneously through both rs, thereby causing a further reduction in the velocity and er retention of the suspended matters. As previously the mineral matters, such as street detritus, etc., that s way into the sewers cannot be reduced by septic action, s wise to prevent as much as possible of this matter from g the septic tank, as the length of time between sludge ls will be materially increased and the cost of operation accordingly.

SEPTIC TANKS

eptic tanks shown in detail on plate 2 are 100 feet by 18 th an average depth of nine feet below the sewage level; e to be constructed of concrete, placed mostly below the of the ground and covered with a double roofing for the of preserving a uniform temperature of the sewage. apacity of these tanks is about 122,000 gallons, or about

3½ hours estimated flow. The plan recommended for the first installation includes two septic tanks, or a provision of stalling of about seven hours. This rest period is somewhat less than is usually provided, but the two tanks are deemed of ample size for the first construction, inasmuch as it may be some time before the estimated flow is attained and the sewage which is originally weak and dilute will be several hours in reaching the disposal grounds and will be relieved of the coarser matters in passing the detritus chamber previous to entering the septic tank.

The inlet chamber which serves both tanks is arranged so that the flow may be equally divided between the two, or the sewage may be divided in any proportion for the purpose of determining the most desirable rest period in planning future extensions of the disposal works. Sewage is admitted to the tank through several openings placed well below the surface, and its height is kept practically at a constant level by means of a weir at the far end of the tank extending over the whole width. The effluent is drawn from about mid-depth, and will contain a minimum amount of suspended matter and cause no disturbance in the bacterial action. The floor of the tank slopes toward the center and to the inlet end of the tank where a gate is provided leading to a sludge pipe through which the deposits may be removed at such intervals as become necessary to the sludge beds.

The plan does not provide baffle boards across the tank except at the entrance end and in front of the inlets, where they will serve in diffusing and making the flow more uniform. Such obstructions as this reduce the area of cross section and increase the velocity of flow, a condition directly contrary to those we seek to obtain. Should experience in operating these tanks indicate that one or more baffle boards would be desirable, it will be a simple matter to suspend them from the floor rafters at any future time.

SLUDGE BEDS

No special construction or preparation of the land is necessary for those beds. A trench may be opened or the ground farrowed to receive the sludge and then back filled. A suitable location for these beds is indicated on the general plans, plates 1 and 6.

RAPID SAND FILTERS

The plan for rapid sand filters includes 16 beds, each 50 feet by 100 feet, with a depth of three feet over the underdrains, which diminishes to two feet midway between them. The beds are placed in two groups of eight each, each group being provided with a separate dosing tank and controlling device whereby some 18,000 gallons may be discharged automatically in from 15 to 18 minutes onto one of the sand beds. A uniform flow of sewage over the beds is arranged for by means of two distributors running longitudinally in each bed. The beds are underdrained by six-inch terra cotta pipe laid in coarse gravel or broken stone. Detail plans of beds, carriers, underdrains, etc., are shown on plates 3 and 4.

Allowing one of the beds to be continually out of service for resting or repairs, the area above specified provides for filtering the estimated volume of sewage (865,000 gallons per day) at the rate of about 500,000 gallons per acre per day. As water tightness is not essential, these beds may be constructed of earth.

The plan for dosing the beds (plates 1, 3 and 5) includes the "Ball Siphon Device," manufactured and controlled by the Pacific flush tank company of Chicago, who guarantee its successful operation. The introduction of this automatic device reduces to a minimum the cost of operation, and while it is to be understood that no mechanical device will work satisfactorily without inspection, it is believed that this arrangement is the most satisfactory for our purpose of any now being operated.

The dosing tanks are to be constructed of concrete and placed below the surface of the ground, one end of the tank being covered by the regulating chamber which contains the automatic device for discharging its contents, the other end being covered by a warmly constructed roof. In the regulating end of the tank eight automatic siphons are connected with the pipes leading to the eight filter beds which the tank is designed to serve. The siphons are set so as to discharge of their own accord should the sewage in the tank reach a height somewhat above that at which the automatic release is intended to operate, and injury to the plant due to a failure to any part of the device is thus avoided.

The discharging of the siphons in rotation is brought about by the apparatus described by the manufacturers as follows:

The operating device consists of eight box shafts, one for each siphon, placed upon the floor above the tank (as indicated on the plans—plate 5), each box being connected with an outgoing and incoming trough, so inclined that a metal ball will readily roll by gravity when lifted to the outlet of one box into the next one, it being necessary to elevate the ball a few inches in each box in order that the circuit may be continuous. Beneath each shaft there is suspended a galvanized iron shield projecting well down into the water within the tank, and in this shield is a copper float with an elevator attached thereto as indicated. On top of this elevator is a seat or cage into which the ball rolls from the incoming trough and passes to such a position that when the elevator is raised to the proper height it will roll off and into the outgoing trough. All floats and elevators rise and fall freely with each filling and emptying of the tank.

Connecting with the top of the air dome of each siphon is an air pipe which is led to and terminates with an air cock conveniently placed beneath the section of trough leading to the respective shaft and elevator, and in the bottom of each trough is a trip lever so arranged that when the ball strikes it in its descent it carries the lever down and opens the air valve, setting the siphon into operation, the ball remaining on the end of the lever and resting against a guide on the side of the elevator, which is at its maximum height. As the water is drawn from the tank the float descends until the cage is opposite the ball, when it rolls into the elevator and the counterweight on the air cock raises the trip lever and closes the cock. The ball then goes down with the elevator to a seat fixed in the bottom of the galvanized-iron shield, where it remains until the liquid is drawn off to the bottom of the bali of the operating siphons, when air is drawn in and the discharge ceases. The tank begins to fill again and repeats the operation, sending the ball on to the next siphon in the circuit.

CONTACT BEDS

The plan of contact beds includes nine beds each 45 feet by 80 feet, with a working depth of four feet and a roofing of coarse stone one foot thick. As it is essential for the beds to be watertight, provision is made for concrete floors and sidewalks. The beds are placed in one group and an arrangement is provided for automatically discharging the flow from the septic tank to the beds in rotation. Assuming one-third of the total volume of the beds to be voids, each bed would be of a sufficient size to hold one hour's flow at the estimated rate (865,000 gallons per day) and with three fillings per day one bed may be continually out of use for recuperation or repairs. The sewage is distributed to the beds through terra cotta pipes laid with open joints in the upper roofing course. Underdrains leading to the outlet chamber assist in collecting the sewage after the desired contact has been had.

For the control of the contact beds the Adam's automatic air locks and timed siphons manufactured by the Adam's sewage lift company have been included in these plans. Plates 7 and 8 show the main carrier connecting the septic tanks with the inlet chamber of each contact bed in which is placed the air-locked siphon discharging into the distributors.

Within the bed is a small chamber in which two air domes are placed so that the sewage in entering, compresses the air in the domes. The larger dome is connected with the siphon feeding its bed, and as the air is compressed the siphon is cut out of operation. The compressed air from the smaller dome is used to start in operation the siphon in an adjoining bed by bursting the water seal of the main trap. A system of by-passes makes it possible for any bed or beds to be put out of use, and the remaining beds to be worked in rotation.

The release of the sewage from the bed is brought about by a timed siphon placed in a small chamber outside the bed, the siphon starting automatically when the sewage in the chamber reaches a given height. The time of filling this chamber, which gives the desired time in contact in the bed, is regulated by the opening of the valve on the feed pipe to the chamber. As the chamber is emptied an overdraft tube is started in operation which drains the entire bed. The working of the beds is thus made entirely automatic.

If the contact-bed system is selected for the disposal plant it may be well to rearrange the air-lock feeds, grouping them all within a small building where they can be better protected from the severe winter weather and where greater range in working the beds may be provided by installing a device similar to the one designed for the sand filter beds.

ESTIMATES OF COST

The cost of constructing the disposal plants is estimated as follows:

Plan of Sand Filtration

Land	$9,000
Detritus chambers	200
Two septic tanks	4,600
300 feet of outlet sewer, sludge pipes, manholes, etc.	860
16 sand filter beds, complete with dosing tanks and regulating apparatus	21,000
Engineering and contingencies	3,340
Total	$39,000

Plan of Contact Beds

Land	$9,000
Detritus chambers	200
Two septic tanks	4,600
300 feet of outlet sewer, sludge pipes, manholes, etc.	840
9 contact beds complete, including controlling devices,	22,800
Engineering and contingencies	3,560
Total	$41,000

Either of the two plans of disposal, if properly constructed and operated, should give a satisfactory effluent; sand filtration, however, will accomplish the higher degree of purification, and can be operated and maintained at less expense, and is therefore preferable. The estimate of cost of filter sand is based upon the assumption that suitable material can be procured from the New York Central railroad at a cost not exceeding that for the LeRoy broken stone. Should this not be the case at the time it is desired to begin construction, it may be advisable to adopt the contact bed system. It is, therefore, recommended that both plans of disposal be submitted to the State Board of Health for their approval, and the selection of the plan delayed until the time of letting contracts for the work.

Very respectfully yours,

GLENN D. HOLMES.

Batavia, N. Y., July 11, 1902.

APPENDIX

CONTENTS OF APPENDIX

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TABLE 1. List of Plans accompanying this report......... 45

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LIST OF PLANS ACCOMPANYING THIS REPORT

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APPENDIX — TABLE No. 2

GALLONS OF WATER PUMPED BY THE BATAVIA WATER DURING THE YEAR 1900 — COMPILED FROM THE WATER REPORT OF 1900

Month.	Total Gallons Pumped.	Daily
January	47,549,328	1,5
February	43,919,136	1,5
March	56,383,816	1,8
April	33,498,018	1,1
May	45,108,336	1,4
June	53,741,648	1,7
July	47,082,486	1,5
August	57,612,514	1,8
September	45,824,843	1,5
October	42,916,944	1,3
November	38,683,564	1,2
December	37,619,848	1,2
Total	549,940,481	1,5

APPENDIX — TABLE 3

GROUND WATER REACHING SEWERS

ABSTRACT FROM TEXT-BOOK ON SEWER DESIGN BY H. N. OGDEN

Kalamazoo, Mich.	Estimated to be 20 per cent of the capacity of the sewers. Twenty per cent of the capacity of the outlet sewer planned for Batavia equals about 57,000 gallons per mile per day for the sewers to be built immediately.
Norfolk, Va.	At least 60 per cent of the pumping, or 100 gallons per inhabitant having sewer connections. Sixty per cent of the present pumping of the Batavia water works would equal about 41,000 gallons per mile per day for the sewers planned to be built immediately.
Schenectady, N. Y.	From measurements at time of completion of the sewers, equalled 5 per cent of the capacity of the mains. Five per cent of the capacity of the outlet sewer planned for Batavia equals about 14,000 gallons per mile per day for the sewers to be built immediately.
Canton, Ohio.	In 20-inch outfall sewer, no connections, 2,400 feet long, rate of 70,000 gallons per mile per day. In the same system, including 11 miles of sewers, 26,500 gallons per mile per day.
North Brookfield, Mass.	1580 feet of 12-inch pipe, 17,000 gallons per mile per day.
Brockton, Mass.	16 miles of sewers—25,000 gallons per mile per day.
Altoona, Pa.	6100 feet of 27-inch pipe, 40,814 gallons per mile per day. 3190 feet of 30-inch pipe, 86,592 gallons per mile per day.
Batavia, N. Y.	Allowance made in estimate for present requirements — 22 miles of sewers, 25,000 gallons per mile per day.

APPENDIX — TABLE 4

ANALYSIS OF RAW SEWAGE AND SEPTIC EFFLUENT

Parts per 100,000 *by weight*

	ALBUMINOID AMMONIA			OXYGEN CONSUMED.		
	Raw sewage.	Septic effluent.	Per cent of purification.	Raw sewage.	Septic effluent.	Per c of p ficati
Mass. Board of Health, 1898	0.79	0.41	48.1	4.00	2.29	4
Champaign, Ill., November, 1898	0.368	0.064	82.6	4.15	0.93	7
Champaign, Ill., February, 1899	0.592	0.054	90.9	4.90	0.86	8
Champaign, Ill., May, 1899	0.366	0.036	89.2	2.76	0.65	7
Pawtucket, R. I., April-Oct., 1900	1.442	0.846	41.3	17.572	8.525	5
Fon du Lac, Wis., March, 1902	0.540	....	....	8.00	2.90	6
Fon du Lac, Wis., March, 1902	0.16	....	....	5.07	2.96	4
Kimberly, England	2.30	0.60	74.0	....	....	..
Exeter, England	0.48	0.25	47.9	....	....	..
Hopedale, Mass., March 12, 1900	0.82	0.32	61.0	5.10	2.40	5

APPENDIX — TABLE 5

ANALYSES OF RAW SEWAGE AND EFFLUENT FROM SEPTIC TANK AND CONTACT BEDS

Parts per 100,000 by weight

LOCATION.	ALBUMINOID AMMONIA.				OXYGEN CONSUMED.			
	Raw sewage.	EFFLUENT.		Per cent of purification.	Raw sewage.	EFFLUENT.		Per cent of purification.
		Septic tank.	Contact bed.			Septic tank.	Contact bed.	
Pawtucket, R. I., April-October, 1900, single contact bed No. 14	1.422	0.846	0.434	69.97	17.572	8.528	4.222	76.0
Pawtucket, R. I., April-October, 1900, single contact beds, No. 15	....	....	0.414	71.3	....	....	3.533	79.9
Pawtucket, R. I., yearly average 1901, single contact beds, No. 14	....	....	....	71.9	....	....	....	71.7
Pawtucket, R. I. yearly average, 1901, single contact beds, No. 15	....	....	....	77.2	....	....	....	77.5
Pawtucket, R. I., yearly average, 1901, double contact beds, Nos. 15 and 16	....	....	....	82.7	....	....	....	82.6
Pawtucket, R. I., yearly average, 1901, double contact beds, Nos. 15 and 17	....	....	....	86.1	....	....	....	85.2
Fon du Lac, Wis., March 11, 1902, single contact	0.54	....	0.10	81.4	8.00	2.90	0.46	92.5
Fon du Lac, Wis., March 26, 1902, single contact	0.16	....	0.10	37.5	5.07	2.96	0.53	90.5
Oswestry, England, August, 1899, double contact	1.136	....	0.130	89.8	4.0	....	0.30	92.5
Oswestry, England, January, 1901, double contact	1.800	....	0.174	90.3	2.8	....	0.40	86.0
Kimberley, England, single contact	2.3	0.60	0.13	94.1	....	....	....	....
Kimberley, England, double contact	....	....	0.09	96.	....	....	....	....
Exeter, England, single contact	0.43	0.25	0.09	81.1	....	....	....	....

APPENDIX —

SIZE AND CAPACITY OF

LOCATION.	Population.	Volume of sewage, gallons, per day, including ground water.	Plan of disposal.
Champaign, Ill	10,000	300,000	1 septic tank
Holland, Mich	......	60,000	1 septic tank, 3 compartments
Wauwatosa, Wis	3,000	100,000 96,800	1 sep. tank, 5 comp., sand filters
Pawtucket, R. I	......	162,622	1 septic tank, 13 sand filters
Marion, Ill	4,200	165,000	1 septic tank, 4 sand filters
Hopedale, Mass	......	127,000 170,000	2 septic tanks, 4 sand filters
Glencoe, Ill	600	25,000	1 septic tank, 8 double contact beds
Plainfield, N. J	16,000	720,000 1,200,000	2 septic tanks, 8 double contact beds
Overbrook, N. J	......	80,000	2 septic tanks 3 contact beds
Verona	......	40,000	1 septic tank, 4 contact beds
Fon du Lac, Wis	15,110	500,000	2 septic tanks, 4 contact beds
Aldershot, Eng	......	1,000,000	1 septic tank, contact beds
Barrhead, Scotland	10,000	400,000 480,000	4 septic tanks. 8 contact beds
Exeter, England	1,500	....	1 septic tank, 5 contact beds
Recommended for enlargement at Exeter England	46,000	1,064,610	6 septic tanks, 8 filters
Recommended for Batavia	4,200*	865,000	2 septic tanks, 16 sand filter beds.

*To be provided for at present.

TABLE 6

VARIOUS PURIFICATION WORKS

Dimensions of septic tanks.	Dimensions of disposal beds.	Filtering material.	Reference.
37′×16′×5′......	None..........	None............	Eng. News. August 17, 1899.
100′×14′×6.5′....	None..........	None............	Eng. Record, March 16, 1901.
50′×20′×8′.	30′×60′×3′.....	Sand............	Eng. Record, December 14 1901—February 8, 1902.
100′×30′×3′.....	2.36 acres.......	Sand............	Eng. Record, February 16, '01.
62.7′×37.2′×6′...	125′×125′......	Sand............	Eng. Record, April 6, 1901.
40.7′×12.5′×11.5′	110′×300′.....	Sand............	Eng. Record.
	120′×180′.....	....	Eng. News. April 25, 1901.
56′×10′×6.7′.....	17.8′×14′×4′...	Cinders..........	Eng. Record. October 19, 1901.
100′×50′×6′.....	106′×92′×4′....	Trap rock & cinders	Eng. Record, March 16, 1901
58′× ′×1.5′.....	70′×30′×3′.....	Sand on coke ...	Report J. D. Schuyler for Nat. Home near Santa Monica, Cal.
50′×18′×10′.....	80′×30′×3′.....		
50′×18′×10′.....	14′×14′×4′.....	Coke............	Report J. D. Schuyler for Nat. Home near Santa Monica, Cal.
172′×48′.........	130′×54′.......	Cinders..........	Eng. News, May 22, 1892.
58′×38′×4′......	58′×38′×4′.....	Coke............	Report of J. D. Schuyler for Nat. Home near Santa Monica, Cal.
10′×18′×7′......	55′×54′×4′.....	Clinkers..........	Rideal. "Bacterial Purification of Sewage," 1901.
64.8′×18′×7.5′...	720 sq. feet.....	Coke............	Eng. News, January 13, 1898.
181′×35′×7′.....	2.5 acres total...	Clinkers on gravel..	Rideal. "Bacterial purification of Sewage," 1901.
100′×18′×9′.....	100′×50′×25′...	Sand............	

BRONXVILLE

Original plans

Original plans in detail for a complete system of sewers and sewage disposal for this village were approved by the State Commissioner of Health on May 14, 1902, and comprise the following:

(1) Report of the designing engineer, dated September, 1900; hereto appended.

(2) Addenda to the original report, dated April 15, 1901; hereto appended.

(3) Addenda No. 2 to the original report, dated April 7, 1902; hereto appended.

(4) Contract and specifications (not printed).

Also nine plates of drawings, as follows:

Plate 1. General sewer map of the village, forming Plate IX of this report.

Plate 2. Sections of test pits, forming Plate X of this report.

Plate 3. Plan and sections of disposal beds, forming Plate XI of this report.

Plates 4, 5, 6, 7, 8 and 9 comprising profiles (not printed).

ADDENDA TO THE REPORT ON THE SEWERAGE AND SEWAGE DISPOSAL OF THE VILLAGE OF BRONXVILLE, WESTCHESTER COUNTY, N. Y.

NEW YORK, *April* 15, 1901

To the President and Officers of the Village of Bronxville:

I have the honor to submit to you addenda to my report dated September, 1900. Inasmuch as you have desired to have some further investigation of your drainage system made, and have asked me to prepare working drawings and specifications to be submitted to the State Board of Health, New York, and subsequently to be used for obtaining bids from contractors for the execution of the work.

I received authority to make these further investigations through your president, Mr. Frank R. Chambers, and also to make a survey from Bronxville to the Mount Vernon pumping station, the work to be paid for by the day, for myself and my assistants, as it was impossible to know in advance just what it would cost. I would further state that the action of your president was taken on account of the feeling in the village that they wished to have something definite to submit to the State Board of Health, and to have every possible outlet investigated.

When the original report was made up the survey to Mount Vernon was not made, inasmuch as you had received an expression of feeling from Mount Vernon which led you to believe that they would not even consider a combination, should it be possible to effect it, but as this was somewhat modified, you wished to see if it was possible to make any such union.

This survey was made and I submitted a plan with a letter to you which was of such a character as to discourage any further action, as the levels were almost the same in the pump well at Mount Vernon and your outlet at Bronxville. The requirements of the New York State Board of Health necessitated the following plans and specifications, which I am sending you:

Plan on scale of 250 feet to the inch, or larger, showing the village and the system of sewerage;

Profiles on each one of the roads showing the surface of the roads, sewers, cellars, etc.

Detail plans of sewers and connections;

Detail plans of disposal works;

Specifications of the construction of the system of sewers and the disposal works;

A general report on the whole subject (this you have already had), and I would furthermore state that they insisted on the plans being in duplicate, one of which must be a tracing (this necessitated tracing all our work a second time, causing considerable trouble).

From these working drawings which I would say have been somewhat modified in one or two respects owing to advisable changes having been found possible from recent negotiations, benefiting the system by changing the direction of some of the lines of the sewers (but in the main they are the same as were originally proposed).

I have prepared an estimate on constructing the high level disposal works or filter beds, and also certain lines of sewers (as outlined on the general plan by the yellow lines) which it is, I believe, your intention of constructing at once. The estimate is as follows:

Disposal works	$9,984 35
High level, Eastern division—Midland avenue, Ponfield road, White Plains road and Elm Rock road, as shown by yellow on print (including replacing roading)	8,193 50
High level, Western division—proposed road across Mr. Kraft's, Cedar street, Ponfield road, Kraft avenue and Park place, as shown by yellow on print (including replacing roading)	4,455 30
	$22,633 15
Engineering and inspection, about 10 per cent	2,263 31
	$24,896 46

This estimate has been carefully gone over, and a reasonable allowance made for rock and sustaining piles where it may be necessary to go through ledges or uphold the pipe in soft places. It is, however, absolutely impossible to tell just what these contingencies may cost. I would, therefore, say that while this estimate is closely approximate it is not absolutely fixed.

Respectfully submitted

CHAS. W. LEAVITT, JR.

ADDENDA No. 2 TO THE REPORT ON SEWERAGE AND SEWAGE DISPOSAL OF THE VILLAGE OF BRONXVILLE

NEW YORK, *April* 7, 1902

To the President and Officers of the Village of Bronxville:

I have the honor to submit to you Addenda No. 2 to the report of September, 1900.

At the hearing given at Bronxville on March 8, 1902, by Health Commissioner Daniel Lewis, there was much discussion on the subject of sewage disposal, and after the various suggestions were made the Commissioner said that it might be well to follow the suggestion made by the engineer of the Board of Health, that a septic tank be constructed and the effluent be turned directly into the Bronx river for the present. Should this subsequently create a nuisance, the filter beds could then be added. In other words, the Board of Health would approve the plan of septic tanks and filters as a whole, but give us the privilege of only constructing the tank at present with the understanding that we would add the filters when necessary.

With this in view I made a trip to Schenectady and went over the matter with their engineer, and made some alterations in the arrangements of the tanks which I believe now meet with his approval.

It is the intention to so construct these tanks that the anaerobic bacteria may act on the sewage and bring it to a condition which will render it unobjectionable to turn it into the Bronx river, and yet be applicable to turn on to the filters should we so elect.

With this in view I have redrawn the plans and located the tanks and filters on the property of Mr. Chambers, south of Midland avenue and in the city of Mount Vernon.

I would suggest, first, that you acquire sufficient land to put in this entire plant; second, submit the proposition to your council that you may take proper care of the legal phase of owning land in another city; and third, follow the suggestion of the Board of Health and build the sewers and the septic tanks at once.

The cost of doing this work is approximately as follows:

Septic tanks complete	$5,000 00
Sewers on Ponfield road, Cedar street, Kraft avenue, Park place and through private property to septic tank	6,400 00
	$11,400 00
Engineering and superintending, etc., about 10 per cent	1,140 00
	$12,540 00

I would further suggest that as soon as these plans have been passed on by the Board of Health that you instruct me to obtain contractor's bids, and let a contract for this work, so it may be completed by next fall.

Yours truly

CHAS. W. LEAVITT, JR.

April 9, 1902.

P. S.— I have just been informed that the street in the village of Bronxville known as "Park place" lies on private property. If this is the case, and you, therefore, do not wish to include this in the portion to be constructed immediately it will reduce the total cost about $290, and will in no way interfere with the efficiency of the rest of the system. I have changed the plans as to the portion recommended to be constructed at once by leaving out Park place.

CHAS. W. LEAVITT, JR.

ILION, N. Y.

Plans for sewer extensions

Original plans for a system of sewerage and sewage disposal for this village were approved by the State Board of Health on January 11, 1893, and changes therein were approved by the

Board on August 25, 1893. These plans, with their modifications, appear in the 14th annual report of the Board.

An amendment to the plans by which it was made possible to omit a pumping station were approved by the State Board of Health on January 16, 1894, and appear in the 15th annual report of the Board.

Plans for the extensions of the system, including some modifications, were approved by the State Commissioner of Health on February 13, 1902, and appear in this report. These plans comprise the following:

(1) A letter from the designing engineer dated February 8, 1902, connecting the new extensions with the original system, and appended hereto.

(2) A set of 15 sheets of street maps and profiles, forming Plates XII to XXVI.

JAMES D. RINGWOOD
CIVIL ENGINEER
BANK BLOCK, MAIN STREET

ILION, N. Y., *February* 8, 1902

OLIN H. LANDRETH, *Consulting Engineer, State Department of Health, Schenectady, N. Y.:*

Dear Sir—I send you by American Express to-day tracings of the proposed sewer extensions of Ilion, N. Y. The tracings show the extensions in plan and profile, and where the connections are made with the existing system; also sizes of pipe, grades, and all the cellar bottoms on the proposed new lines. You have on file in your office at Albany a contour map of the village, showing the present system as constructed in 1893 and 1894, also details of manholes, flush tanks, and a copy of the contract and specifications and a general description of the village as regards population, area sewered, etc. We will use the same contract, specifications, and construct the manholes, flush tanks, etc., like the ones now in use, so that the new part will be identical to the part already constructed. I might add that the population of the village, taken January, 1902, is 5333, and that there are now about forty-five houses ready to connect with the new sewers, and will probably be as many more built during the coming summer. If there is any more information that you need I will cheerfully send it at any time.

Very truly yours

J. D. RINGWOOD

LARCHMONT MANOR, N. Y.

Change of plan

Original plans for the sewer system of this village were approved by the State Board of Health on May 20 and 24, 1898, and appear in the 19th annual report. Plans for a change of location of the outlet sewer were approved by the State Board of Health on April 16, 1899, and appear in the 20th annual report of the Board.

On January 15, 1902, the State Commissioner of Health approved a plan for changes and additions to the system, which plans appear in this report. These comprise the following:

(1) A report by the designing engineer dated December 14, 1901, hereto appended.

(2) A supplemental report by the designing engineer dated January 10, 1902, hereto appended.

(3) A general sewer map of the village, showing existing sewers, proposed sewers and water drains, forming Plate XXVII of this report.

(4) A profile and cross-section of the proposed outlet sewer and storm-water sewer, forming Plate XXVIII of this report.

(5) A section of manhole for outlet sewer and storm-water drain, forming Plate XXIX of this report.

(6) Form for proposals, contracts, specifications, and summary of bids (not published).

REPORT OF EDWARD F. CAMPBELL, C. E., AS TO ALTERATION OF OUTLET SEWER IN VILLAGE OF LARCHMONT, WESTCHESTER COUNTY, N. Y.

To Hon. DANIEL LEWIS, M. D., *Commissioner of Health, New York State Department of Health, Albany, N. Y.:*

Sir—The area embraced by the alteration of the outlet sewer and addition, as shown upon the maps and profiles herewith submitted, is located in the more built-up and more densely settled portion of the village than any other of the same extent. The section covered by this alteration lies in a basin and forms the very heart of the residential portion of the village, including its churches and other fine buildings, and it is restricted solely to that purpose. It is, however, subject to overflows from sudden floods during heavy rainfalls. The old outlet sewer, constructed about thirty years ago by the Larchmont manor company, a land improvement company, has been found to be quite inadequate and defective in design and construction. It was laid with curved lines without proper manholes. At its outlet it is only 15 inches in diameter, while in portions of Circle avenue, Myrtle avenue, Circle park and Linden avenue it is from 18 to 20 inches in diameter. The alteration consists in constructing the sewer at a lower level and of a uniform diameter of 24 inches from the Sound to Linden avenue, through Grove avenue to Prospect avenue, and of sufficient capacity to carry off all the sewage and surface water. It is designed to take surface water and discharge it into the Sound into deep water, as well as the sewage, so far from the shore of the park as to preclude creating any nuisance. It is to be constructed with broken stone foundation for ground-water drainage, and the plans have been accepted by the board of trustees of the village, subject to the approval of your Department, and the electors of the village have already authorized an issue of bonds to the extent of $15,000 for the construction thereof. The streets through which this sewer, as altered, will pass, are all graded, and the data in that regard are given upon the present ground levels.

The outlet sewer proper into the Sound is to be constructed of 100 feet of 24-inch cast-iron pipe, with Ward flexible joints; 100 feet of 24-inch cast-iron pipe spigot and bell, and the rest to be laid upon solid broken stone foundation, 2050 feet of 24-inch; 850 feet of 20-inch; 150 feet of 15-inch, all vitrified stone tile pipe, with proper branches, Ys for house and catch-basin connections, with 17 manholes placed at each and every turn of the sewer so that between the same the pipes will be absolutely straight.

The level of the sewer for the first 100 feet will have a fall of six feet, then for nearly the same distance a fall of one foot, and after that a uniform fall of four inches to every 100 feet.

In 1898, for another portion of the village, a separate sewer system was designed and constructed under the supervision of Lawrence E. Van Etten, C. E., approved by your Department, and his plans and profiles are on file in your Department. I beg leave to refer to the same, as I have very closely followed his method of construction as to manholes and other particulars, which had the unqualified approval of your Department.

I should say that the alteration of the sewer, for which your approval is asked, will afford proper sewage facilities for the greater portion of the village of Larchmont, and that it empties directly into deep water in the Sound and not into any inlet or harbor, as does the other, constructed under Mr. Van Etten's supervision. As the present work is simply an alteration and reconstruction of a sewer already in existence, I have not deemed it necessary to repeat the full data and details furnished by Mr. Van Etten, and in this respect wish to say that the elevations, levels and other data usually called for are given upon a map of the village of Larchmont, designed by Julius Biem & Co. of New York, showing elevations and contour lines from United States government surveys, which map was included in a large atlas of Westchester county, published in 1892, and which, I believe, is on file with your Department. For your inspection, however, I beg to hand you the only copy I have of said map, with the request that the same may be returned to me. For these reasons I have thought that your Department would not require, under the circumstances, specially prepared contour lines of that section of the village, and I trust that with the information so clear and comprehensive your Department will find no difficulty in approving the plans for the alteration of the existing sewer, which is to be built for the purpose of relieving the present unsatisfactory sewerage and drainage condition in that section of the village of Larchmont.

I have the honor to be

Respectfully yours
EDWARD F. CAMPBELL, C. E.

Dated Larchmont, N. Y., December 14, 1901.

SUPPLEMENTAL REPORT OF EDWARD F. CAMPBELL, C. E., AS TO ALTERATION OF OUTLET SEWER IN THE VILLAGE OF LARCHMONT, WESTCHESTER COUNTY, NEW YORK

To Hon. Daniel Lewis, *Commissioner New York Department of Health, Albany, N. Y.:*

Sir—The area embraced by the alteration of the outlet sewer and additions shown upon map, profile and section or plan of manholes, marked "Plates 1, 2 and 3," herewith submitted, is located, as stated in my report of December 14, 1901, in a section of the village of Larchmont which is more thickly built up than any other portion of the village. This section lies in a basin and forms the heart of its residential portion. It includes all the churches, hotels and public buildings, and is restricted solely to residential purposes. Owing to the improvements of the ground all the rainfall is thrown into the gutters of the streets, and sudden floods from heavy rainstorms must be sent quickly to the Sound to prevent water backing cellars or standing on the streets. In designing alterations of the old sewer these floods had to be taken care of.

Since my report of December 14, 1901, I have had the benefit of suggestions derived from inspection of the ground of Prof. Olin H. Landreth, consulting engineer, and suggestions contained in a letter of your Department under date of January 7, 1902. Acting upon those suggestions, I have revised my former plan and profiles heretofore submitted, and, now, in submitting these revised plans, profiles and section, I desire to say:

Following the suggestion about separating storm water from sewage, I have prepared plans of a system of drainage and sewer which I think embraces the features recommended, and which I trust will have the approval of your Department.

As to the storm-water sewer or drain, the plan contemplates the construction of a 24-inch drain of tile pipe from the Sound to the intersection of Prospect and Linden avenues; thence to the intersection of Walnut and Beach avenues a 20-inch drain; thence running 150 feet south on Beach avenue a 15-inch drain. This drain is intended to afford relief from storm water to at least 44 acres of ground, consisting of four acres of roof water, 18 acres of street surface, and the rest of lawns and other vacant lying property. The first 292 feet of this drain commencing at the Sound has a grade of seven-tenths (.7) of a foot per 100 feet, and the rest a grade of four-tenths (.4) of a foot per 100 feet; manholes being provided at every curve, turn and intersection of streets. The under drainage of this pipe is designed to be constructed of 2-inch broken stone, as shown on Plate 2; all house connections to be 5-inch Y branches directly into the sewer and not into any manhole; only intersecting lateral street sewers being allowed to enter into manholes below flow line of storm-water drain; all catch basins to be connected by 8-inch Y branches to storm-water drains, and all to be trapped in such a manner as to prevent sediment entering main storm-water drains, and all to be trapped in such a manner as to prevent sediment entering main storm-water drain. All house leaders are to run to street gutters or storm-water drain; and under no circumstances to be allowed to enter the house sewer proper.

The normal rainfall of the area under consideration is one cubic foot per acre per second. I have calculated that one-third of this quantity will enter the storm-water drain at a given time, which will be 870 cubic feet per minute. The capacity of the drain is calculated to carry off, on an average, about 900 cubic feet per minute. It is impracticable to construct a storm-water drain of tile pipe greater in diameter than the one designed, for the reason that there would not be sufficient covering for a drain pipe of tile. The construction of a brick drain is considered too expensive for the community.

As to the house sewer, so-called, the plans and profiles which I have prepared are shown upon said Plates 1, 2 and 3. It is designed to be 10 inches in diameter at its outlet into the Sound by iron pipes for a distance of 300 feet in all from high-water mark; the first 100 feet being of spigot and bell, and the remaining 200 feet of Ward flexible joint laid on stone foundation and covered, as shown on Plate No. 2. The extreme end of this iron outlet into the Sound is 150 feet from any shore point in that vicinity, and is covered by at least 12 feet of water at United States coast survey, low tide. This iron pipe outlet is to be laid at a grade of 6 feet per 100 feet, and is also planned to allow for a tide valve to be used at high-water mark, in case of introduction at any time hereafter of a system of septic tank sewerage clarification.

Commencing at the manhole on the shore, the grade of the sewer for the first 292 feet inland is seven-tenths (.7) of a foot per 100 feet. From that point the rest of the sewer is at grade of four-tenths (.4) of a foot per 100 feet, the diameter of the sewer being 10 inches up to the intersection of Linden avenue and Prospect avenue, and the remaining being 8 inches. The capacity of this sewer is planned to take all the house sewage as far up as the Boston post road, which is not otherwise provided for by the large sewer approved in 1899 by the State Board of Health. In planning this sewer I have based my calculations on 174 houses averaging 8 people each, 4 hotels averaging 250 people each, and 51 stables averaging 2 people each, making a total of 2494 people. I have figured the sewage per capita at 60 gallons a day of 10 hours, making 149,640 gallons of sewage in that time, which being divided first by 10 makes 14,960 gallons per hour, and which divided by 60 gives 249 gallons per minute. This sewer having a capacity of 573.5 gallons a minute, will meet the estimated requirements of this community. Provision is made for flush tanks whenever they shall be required. The grade of the sewer was determined to give proper sewerage at its extreme inland end, which point is 150 feet south of the intersection of Walnut and Beach avenues, where the flow line is at a depth of 7 feet from the street surface.

The sewer and storm-water drain are designed to be laid in the same trench, as shown on Plate No. 2. The flow line of the sewer is one foot below the flow line of the storm-water drain, and passes through the same manholes, as shown on Plate No. 3. The storm-water drain is designed to be water tight, with water-tight iron covers for inspection and cleaning, the sewer, however, being left open in the manholes for ventilation and inspection, as shown on said plate.

As to the right of the village to construct the sewer through the park, I ought to add that the privilege was given upon the distinct understanding that the two old outlets in the vicinity be discontinued.

In reference to the suggestion of bringing all the sewage of the village to two outlet points where septic tanks may be used, I have shown on Plate No. 1, proposed electric lifts at such places where outlet cannot be reached by gravitation. If at any time hereafter such lifts should be recommended by your Department they can readily be introduced.

With these brief explanations, which I trust will elucidate my plans and profiles, I have the honor to be

Respectfully yours

EDWARD F. CAMPBELL, C. E.

St. Com. and Eng.

Dated Larchmont, January 10, 1902.

MAMARONECK, N. Y.

Change of sewer plan

Original plans for a sewer system for the village of Mamaroneck were approved by the State Board of Health on December 21, 1900, and appear in the 21st annual report of the Board. On February 5, 1902, the State Commissioner of Health approved plans for a change of the point of discharge into Mamaroneck harbor. These plans comprise the following:

(1) A general sewer map of the village of Mamaroneck and Mamaroneck harbor, showing proposed changes in the place of discharge, forming Plate XXX of this report.

(2) A profile of the new outlet line, forming Plate XXXI of this report.

(3) A letter from the designing engineer dated January 28, 1902, describing the proposed change, hereto appended.

MOUNT VERNON, N. Y., *January* 28, 1902

J. F. HUNTER, M. D., Messrs. THEODORE VAN AMRINGE AND JOHN W. GOODWIN, *Sewer Commissioners, Village of Mamaroneck:*

Gentlemen—As per your instructions, I have prepared and submit herewith a proposed change in the sewerage system of the village of Mamaroneck, which consists of the change in the point of outlet of the sewage from the main land section of the village, and the necessary change in the sewer mains to carry the sewage from the main land to the said new point of outlet.

At the time of preparing the original plans it was thought advisable to arrange to collect the sewage of the entire village at a single point of disposal and outlet. The most available point, topographically, for such collection was the point at the foot of Oakhurst avenue, as shown on the original plans approved by the State Board of Health, December 21, 1900.

Since the preparation of the original plans it has been deemed advisable to arrange for a separate outlet for the main land section of the village, leaving the Oakhurst and Orienta Point sections to discharge at the point of outlet originally selected.

The principal demand for an immediate construction of the sewerage system, from a sanitary standpoint, is for the main land section. The Oakhurst and Orienta Point sections are built up with detached houses, most of the residences having large grounds around them, and the majority of them have at present sewage facilities furnished through private sewer connections. There is practically no demand, therefore, for an immediate construction of the sewerage system of the Orienta Point and Oakhurst portions of the village, and consequently it has been deemed wise not to incur the greater expense of the large main necessary to carry the sewage from the main land portion of the village to the original proposed point of outlet at the foot of Oakhurst avenue, since an outlet can be obtained into the main channel but a short distance from the originally proposed outlet, and with a much less initial cost of construction.

The proposed change is to construct from the foot of High street a 20-inch outlet main running southwesterly to the foot of Mamaroneck avenue, and thence under or near the causeway and across Harbor Island to a point of discharge in the main channel in the vicinity of the Harbor Island dock, with the disposal works similar to those already approved by the State Board of Health, situated on Harbor Island adjacent to its southerly extremity, in such convenient location as may be agreed upon between your commission and the owners of Harbor Island. The discharge will be in the channel which has a depth of eight feet at mean low water and about 15½ feet at mean high water, the channel being the outlet channel through the harbor for the Mamaroneck river.

I have been able to increase the grade on this new outlet sewer from that of the original outlet sewer, and have therefore extended the 20-inch outlet main to the point of outlet instead of increasing the size to 24 inches, as was found necessary on the original main outlet to Oakhurst avenue.

Respectfully yours

JOHN F. FAIRCHILD

Engineer

NEW HARTFORD, N. Y.

Changes in plans for sewers and sewage disposal

Original plans for a system of sewerage and sewage disposal were approved by the State Board of Health on December 31, 1896, and appear in the 17th annual report of the Board.

Plans for amendments to the sewer system, and also plans for a different system of sewage disposal, were approved by the State Commissioner of Health on January 28, 1902.

These plans comprise the following:

(1) A sewer map of the village of New Hartford, showing amendments, and forming Plate XXXII of this report.

(2) A map of the proposed location of the amended sewage disposal works, forming Plate XXXIII of this report.

(3) Plans for the amended sewage disposal works, forming Plate XXXIV of this report.

(4) A report by the designing engineer describing the amended plans, hereto appended.

(5) Contract, specifications and instructions to bidders for the amended system of sewers and sewage disposal (not printed).

To the Board of Trustees of the Village of New Hartford, N. Y.:

Gentlemen—In accordance with your instructions of November 30, 1901, I have taken under consideration the plans for a sewerage system for your village, prepared by me in 1896, and approved by the State Board of Health December 31, 1896, with a view to using them at the present time with only such modifications and amendments as might be necessary to include additions and changes in buildings that have been made since they were prepared; and also to view them in present light in the matter of sewage disposal, with reference to advantages to be gained by using septic instead of anti-septic treatment, and lessening the cost of maintenance.

With reference to general location of the pipe system and distribution of manholes and flush tanks, I see nothing to be gained by a change from the plan. Hence it remains undisturbed.

But in view of the general awakening of public interest in the village, shown in the introduction of a permanent water supply, electric lights for streets and buildings, electricity for power, the organization of an able fire department, the erection of a new high school building, new factories, etc., the reduction in transportation charges over the electric railway from Utica, the extension of the electric roads to other places, and the construction of a sewer system complete for the village, all of which will inevitably, and doubtless soon, result in an increased population, it has seemed best to increase the capacity of the system. This I have done. The outlet pipe has been changed from 12-inch to 18-inch, and some of the tributary pipes made larger than before, as shown on the accompanying map and profiles. This amply provides for a large growth in population, for cellar drainage and overflow from cisterns; but will not admit the street drainage. Nor is it desirable that it should, for reasons stated in my former report.

Perhaps the principal change from the former plan is in the method of treating the sewage and in the location of the works for that purpose. With a view to reducing the cost of maintenance, I have abandoned the chemical treatment and devised a disposal plant on the septic plan. It requires no expensive building, machinery or chemicals, and only a little attention, which one intelligent man can give in a few hours each day. It consists, as shown on the accompanying drawings, of a masonry tank into which the sewage will flow from the outlet pipe of the sewer system. The design is to cause the sewage to be about one day in passing through this tank. From the septic tank it will be distributed to filter or contact beds filled with coke, broken stone, gravel or some acceptible filtering material. The plan shows four of these beds. The intention is to have one bed filling, one standing full, one emptying and one empty all the time, this going on in rotation so that each bed will be resting and airing one-fourth of the time, the length of time being determined by trial of results for the particular sewage treated.

It has been found that there are two distinct classes of bacteria which feed upon and thrive in sewage, both tending to destroy the sewage and change the residual and resulting liquids into a harmless condition. One lives and works without the oxygen of the air, in the septic tank; the other dies when deprived of oxygen. Hence the necessity for airing the filter beds at intervals. But a large quantity of water with the sewage might be detrimental to bacterial action and at the same time lessen the necessity for it. Hence I have placed a valve near the sand well so that in times of much water going into the sewers the sewage can be diverted directly into the creek without going through the septic tank. At such times the flow in the creek will be larger and the dilution will be so great as to render treatment unnecessary. Another valve is provided in case the tank is to be emptied.

If, during the early years of the use of the sewers, it should be found that the quantity of sewage is so small that it remains too long in the septic tank, the difficulty can be easily obviated by building bulkheads across the tank, thus reducing the capacity as much as may be found desirable. Again, if growth of population should result in so much sewage that it passes the septic tank too quickly, the tank can be enlarged by extending it to the northward without disturbing the part already in use.

I have extended the 8-inch sub-drain through Whitesboro street and the outlet to the disposal works, in order to carry the clear water through the effluent drain to make use of it in diluting the effluent immediately, before it leaves the disposal works. This certainly will be an advantage.

I have also changed the location of the disposal works from a plat of land near the highway, and which might sometime be made use of for building purposes, to a plat of less value, situated remote from the highway and out of sight, back of a hill, many hundred feet from the nearest building and where it probably never be used for building purposes. This will add about 1100 feet of piping to reach it, but will be more acceptable to the traveling public and will not unduly increase the cost of construction.

The accompanying plans and specifications show in full the design of the system herein proposed, and include all the amendments to the former plan.

Respectfully submitted
A. M. SCRIPTURE
Assoc. M. Am. Soc. C. E.
Engineer

SARATOGA SPRINGS, N. Y.

Plans for sewage disposal works

Original plans for the sewer system of the village of Saratoga Springs were prepared prior to the date of the passage of the law requiring the approval of the State Board of Health.

Original and complete plans for the system of sewage disposal were approved by the State Commissioner of Health on January 22, 1902, and comprise the following:

Plate 1. General map of street sewer system, new intercepting sewer and disposal works, forming Plate XXXVII of this report.

Plate 2. Map and profile of proposed intercepting sewer, forming Plate XXXVIII of this report.

Plate 3. Plan showing arrangement of pumping machinery, pumping well and reservoir, forming Plate XXXIX of this report.

Plate 4. Plan showing pumping station and grounds, forming Plate XL of this report.

Plate 5. Map and profile of force main from pumping station to disposal grounds, forming Plate XLI of this report.

Plate 6. Topography of disposal area and test pits through filtering material, forming Plate XLII of this report.

Plate 7. Plan of septic tanks, forming Plate XLIII of this report.

Plate 8. Sections of septic tanks, forming Plate XLIV of this report.

Plate 9. Plan of filter beds with sections showing under drains and embankments, forming Plate XLV of this report.

Plate 10. Plan of filter bed details, forming Plate XLVI of this report. Also a report by the designing engineer, describing the system, hereto appended.

REPORT TO THE SEWER WATER AND STREET COMMISSION OF SARATOGA SPRINGS UPON A SYSTEM OF SEWAGE DISPOSAL

[BY SNOW & BARBOUR, *Engineers*]

INTRODUCTION AND DESCRIPTION OF LOCAL CONDITIONS

Saratoga presents unusual conditions for consideration in the undertaking of any municipal improvement. This so-called village, with a normal population of about 12,000 people, increases rapidly in population during the summer season by the advent of visitors to 30,000, and in the month of August to a maximum of nearly 50,000 people. Not only does this annual increase in numbers take place, but a greater and disproportionate demand results for municipal conveniences, making the provision for water supply and sewerage necessarily out of all proportion to the regular population. When, therefore, the question of sewage disposal comes up for consideration it is not the conditions of a village of 12,000 people which must determine the design, but rather those of a city of 40,000 people.

Not only has this seasonal variation in the population complicated the problem of sewage disposal, but it has been made more difficult in the past by an extremely high water consumption, and by the fact that the sewerage system, as originally constructed, was on the combined system—the pipes receiving both sewage and surface water.

The question of sewage purification has faced Saratoga for several years, and the delay in arriving at a solution has been due in great measure to the foregoing complications and the time necessary for their correction or elimination. That much good work has already been done is evidenced by the fact that all catch-basins have been disconnected from the sewers, and more than 80 per cent of the water taps have been metered. The effect of this metering, as will be shown in a later section, has been to reduce the consumption to about one-third of what it was in 1898.

Saratoga lies on both sides of the Village Brook which forms the principal topographical feature of the landscape. On the north slope of the valley rock abounding in springs is found, and as a consequence damp cellars and considerable ground water in the lateral sewers, at certain seasons, results. On the other side of the valley the rock and water table are at a lower level, and there is little leakage into the sewers.

The main interceptor is a 36-inch, single ring, brick conduit, laid through the valley, in great part below the level of the brook. It ends near the Eureka spring, where the sewage was originally discharged into the watercourse. At a later date a 24-inch vitrified pipe was extended to the Kayaderosseras, a distance of about five miles. The capacity of the 36-inch sewer is about 35.0 cubic feet per second, while that of the 24-inch sewer is only 7.0 cubic feet, and the obvious intention in extending to the Kayaderosseras was that only the dry weather flow should be carried to that point, and that the excess during storms would overflow into the village brook at the end of the 36-inch sewer. An overflow weir was accordingly provided between the 36-inch and the 24-inch sewer, and a settling tank was built which, by sedimentation, would intercept the suspended matter. This was done either to insure the self-cleansing of the 24-inch pipe, or else to prevent trouble from floating matters in the Kayaderroseras. Whatever the reason, a nuisance—judging from court decisions—has been created at both points, that at the Kayaderroseras from the regular discharge, and that at the village brook from the storm overflow, and the handling of the deposit at the time of its removal from the settling tank.

The state authorities have ordered the purification of the sewage of Saratoga, and that this must be done admits of no discussion.

GENERAL DISCUSSION OF SEWAGE PURIFICATION

Sewage is water containing in each 1000 parts of liquid two parts of foreign matter. One-half of this matter is organic and putrefactive, the other half mineral, and harmless. It is partly in solution and partly in suspension, and is composed of several elements, the important one of these, from a sanitary standpoint, being the nitrogen. This element is the indicator most used in chemical analyses to express the varying condition of the polluting matter in its transformation from organic to mineral form.

It may not be out of place—in order that the difference between the septic process and other methods be clearly understood—to briefly describe the natural decomposition of sewage. Four principal elements make up organic matter—carbon, nitrogen, hydrogen and oxygen. When the sewage leaves the house this matter is carried by the water—partly in solution and partly in solid form. The water has dissolved in it a certain amount of oxygen, and the first reaction is a combination of this oxygen with the unstable carbon forming carbonic oxide gas, which in great part remains dissolved in the sewage. This leaves the nitrogen and hydrogen free to combine as ammonia.

In uniting with the carbon most of the available oxygen in the sewage is used up, and as soon as this occurs putrefaction or decomposition in the absence of oxygen begins. Until a further supply of oxygen is furnished the decomposition of the ammonias cannot proceed further, but liquefaction of the solids will continue, and experience has shown that it is easier to reduce certain of the organic compounds, such as the cellulose and fats, by putrefaction or liquefaction in the absence of air than in the presence of a plentiful supply of oxygen. In other words, putrefaction is not something to be strenuously avoided, but is a natural reaction essential to the continued habitation of the earth. By it solids difficult to attack by oxidation are readily liquefied and changed to a condition in which, by oxidation, final dissolution to inorganic compounds may take place.

All organic decomposition is initiated by bacteria, and therefore all natural processes of sewage disposal are bacterial. The addition of chemicals which are antiseptic is unreasonable and not in line with modern progress. It makes no difference whether the sewage be discharged into a stream, into septic tanks, or filtered through sand or cinders, the action is bacterial. In all except the septic tank reliance is placed on oxidation initiated by aerobic bacteria; in septic treatment it is one of liquefaction carried on by anaerobic bacteria.

Dismissing from consideration any method of chemical precipitation we may profitably consider the subject of sewage disposal in two parts, first, preliminary treatment for the handling of the solids, and second, purification with or without preliminary treatment.

The suspended matters or the sludge have for years been recognized as the bugbear of sewage disposal—the question to be considered is whether these matters shall be removed from the sewage, whether they shall be liquefied, or whether they shall be applied with the sewage to the filters.

For many years it was an axiom that the sewage must be handled when fresh, because in that way the solids could be more readily separated by sedimentation. The slowness and incompleteness of the separation effected by sedimentation subsequently led to chemical precipitation. By either method the sludge is sidetracked and remains to be handled at great expense and trouble. That it is not worth anything as a fertilizer, except in a theoretical way, has long been known to experienced sanitarians. At Brockton, where the sludge is separated by sedimentation and applied to particular beds to dry out, it amounted in the year 1900 to 1800 tons when dry, and sold for one hundred and twenty-five ($125) dollars, although by chemical analyses it was worth four ($4) dollars per ton. The difficulty, like gold in sea water, is to extract the value. On the other hand, the handling of the sludge at Brockton has cost approximately seventy-five cents per ton, or about fifteen hundred ($1500) dollars. At Worcester the expense has been over three dollars per ton of dry sludge. While, therefore, the removal of the suspended matter, without question, relieves the filters of much work, it is at considerable expense and requires great care to prevent a nuisance.

With increasing experience in sewage treatment there has come an increased appreciation of the value of stale sewage and of the economy of reducing the amount of suspended matters by natural liquefaction. A perusal of the annual reports of the state board of health of Massachusetts for the past ten years clearly evidences this growing appreciation of the value of anaerobic treatment. Practically this tendency culminated in the design and use, at Exeter, England, of the so-called septic tank. The method involves merely the construction of reservoirs, which will permit the sewage to come to practical rest, that the suspended solids may be deposited and the effluent escape through an orifice midway between the top and bottom, so as to disturb neither the sludge at the bottom nor the scum at the top.

The solids after settling to the bottom begin to putrefy and evolve gases, which serve to buoy the particles of suspended matter to the surface, where the gas escapes, and the solids once more fall to the bottom to again repeat the same action. Gradually at the surface a thick scum forms which is practically a mass of anaerobic bacteria or organisms living in the absence of air. At the end of a few weeks the tanks are in working condition, holding back 85 per cent of the solids, and passing an effluent which contains less than 40 per cent of the total organic nitrogen of the raw sewage. So far as the amount of solids which constitute the clogging element goes, a septic effluent compares favorably with that obtained by either sedimentation or chemical precipitation.

As to the accumulation of solids in the tank, experience at various places in England, and notably at the Lawrence experiment station in Massachusetts, has proved it to be extremely small in proportion to the sludge entering the tank. At the latter place the deposit, after two years operation is practically nothing, while the solids which have entered the tank would, without septic action, have filled the tank more than five times. The explanation of this is that the solids are, by the anaerobic bacteria, liquefied, and either pass off in solution in the effluent or escape in the form of gas which is principally methane and nitrogen.. That the septic method is a success is a matter of personal experience of the writer. Plants designed by us for Marion, Iowa, and Warren, Ohio, have now been working, with entire success, for several years. At the first place the effluent is discharged without filtration into a small stream, and at the second the tanks have enabled a coke breeze filter to run with little attendance and at high rates. In neither case has there been any noticeable accumulation of sludge.

The larger part of the cost of operating filters dosed with raw sewage is due to the necessity of cleaning the surface, the condition of which more often limits the possible rate than the internal action of the filter. Because of its ability to reduce the suspended matter and especially the carbon elements, which are the most difficult to handle by filtration, and at the same time to prevent the accumulation of sludge, the septic tank is a most valuable preliminary treatment to any form of filtration.

The effluent from septic tanks contains, of course, no oxygen, and it must accordingly be subjected to some form of aeration before application to the filters. This is because, as already stated, the final purification must be effected by aerobic bacteria in the presence of a plentiful supply of oxygen.

Dilution is for Saratoga out of the question—either in the case of raw sewage, as already proved, or for septic effluent. The available watercourses are not large enough to sufficiently dilute a septic effluent at all seasons, and some form of filtration is therefore necessary.

The success of intermittent sand filters in purifying sewage is demonstrated beyond question. At more than a score of places the system is satisfactorily working under various conditions, and by this method sewage can be purified at all seasons of the year without nuisance, and at a cost of maintenance relatively low, when compared with other methods. The purity of the effluent is also greater than by any other known system, averaging in well-managed plants from 90 to 99 per cent.

Success depends upon proportioning the amount of sewage to the capacity of the available filtering material. Oxygen and time are necessary; the amount of sewage applied must not be in excess of the air capacity of the sands, and the sands must have sufficient frictional resistance to hold the sewage long enough to effect purification. Experience has enabled the engineer to know the capacity of each sand—usually expressed in gallons per acre—from the size of grain which is found by mechanical analyses. Thorough distribution of the sewage over the surface is necessary, and also intermittency of application. For this reason the disposal area should be divided into beds of such an area that with the rate of application to be used the sewage will be distributed when a dose of the desired size has been applied.

Underdrains of vitrified pipe are laid with open joints and surrounded with screened gravel, at a depth of about six feet, and into these pipes the effluent, after remaining in the filters for hours or days,—as determined by the size of the sand grains—finds its way, and thence to the watercourse. As will be already apparent to the reader, the management of filters may be divided into two parts, first, the maintenance of the surface, which is largely determined by the amount of suspended matters in the sewage and the nature of the preliminary treatment, and, second, the condition of the body of the filter, which is dependent upon the proper correlation of the amount of sewage and the rate of application to the quality of the sand. Given suitable sand, and there can be no question, so far as present knowledge goes, as to the relative merits of flow sand filters compared with any other method, provided the economy is anywhere near equal.

In attempting to purify sewage at high rates, two types of artificial filters have been developed. The first is operated similarly to natural sand filters, but is constructed so as to make possible the introduction of abnormal quantities of oxygen. This is effected by building the beds in layers of sand separated by an air space, or by crushed stone, with sometimes mechanical aeration by air compressors. The object in any case is to extend the zone of effective bacterial activity, which in sand filters is practically confined to the surface layer, to greater depths. The weak point in most of these filters is that the second factor necessary for purification, namely, time, is not sufficiently recognized.

Another form of filter is the contact bed—composed of cinders, coke, coal, crushed stone or gravel—material so coarse that there is practically no frictional resistance to the passage of the sewage and necessitating the placing of gates in the underdrains by which the sewage is held in contact with the bed material for a time long enough to effect purification. This form of bed recognizes the time factor and the coarseness of the material insures natural aeration throughout its entire depth. The cycle of operation is first a period of filling; second, a period of standing full; third, a period of emptying, and, fourth, a period during which the bed remains empty. The degree of purification possible is never as high as with sand filters, and the element of uncertainty at the present time is as to whether the body of the filter will gradually fill up with organic matter. At first it was claimed that raw sewage could be handled by contact beds, but it has been proved that the voids of such filters slowly reduce in capacity, and at the present time their principal field is the handling of septic effluent.

The capacity of any filter should be based on the amount of organic nitrogen transformed to nitrates, and not on the gallons of liquid handled, irrespective of the quality of the liquid. It is by a disregard of this fact that claims for extravagant rates are frequently made. Water can be purified at a rate of 5,000,000 gallons per acre, and sewage at rates approaching this—in the ratio of its dilution; but with normal sewage, or such as our analyses have shown to be found at Saratoga, a higher rate than 500,000 gallons per acre has not yet been proved continuously possible in a way to justify its adoption as a basis of design. That these high rate filters have great merit, and under certain conditions a right to exist, there can be no doubt. We have already designed and constructed several plants with contact filters, to operate at rates of 500,000 gallons per acre, but these have all been located where there were no available sands, and where a high degree of purification was not necessary.

As a summary of the present status of various methods of sewage purification it may be unhesitatingly stated that the septic tank constitutes the most valuable method of handling the solids and for final purification, where suitable sands in situ can be economically obtained, intermittent sand filtration is the safest and best system to adopt. In any case the choice of method must be determined by a study of local conditions—the principal of these being the quantity of the sewage, the topography of the territory governing the outfall possibilities and the materials available for filtration. The investigation of these conditions will now be described.

GAGINGS OF WATER CONSUMPTION

The public water is a fair expression of the amount of sewage to be anticipated, except when there is an abnormal amount of leakage into the sewers, or a considerable number of private supplies are in use.

The records of the pumps afford a means of measuring the water consumption of Saratoga. The following table shows the average daily consumption by months from January, 1900, to date:

TABLE NO. 1

TABLE SHOWING MONTHLY AVERAGES OF DAILY WATER CONSUMPTION

Month.	Year 1900. Gals. per day.	Year 1901. Gals. per day.
January	3,280,000	1,755,200
February	3,468,200	1,860,450
March	3,488,800	1,715,160
April	2,883,800	1,427,830
May	2,639,600	1,349,870
June	2,991,000	1,727,720
July	3,228,900	2,150,440
August	3,286,800	....
September	3,122,000	....
October	2,414,000	....
November	1,832,000	....
December	1,690,500	....

The effect of metering is so evident as to make discussion unnecessary.

Up to this year these gagings have not been accurate, because of the necessity of estimating the slip of the pump, but during the present investigation the plungers were repacked so that no slip occurred. Owing to the greatly reduced use of water the pumps are now so large that when the plungers are tight it is difficult to run at a rate slow enough to just supply the present consumption, and a by-pass was accordingly arranged to take the excess. On this by-pass a meter was placed and read synchronously with the reading of the revolution counter, an exact measurement of the water actually consumed being thus obtained. Twenty-four hour runs with readings taken at fifteen-minute intervals were made on April 29th, May 27th and August 10th, this series serving to show the consumption of the regular population, and the effect of the summer increase.

The following table gives the results of these gagings and shows the variation in the rate of consumption at different hours:

TABLE No. 2

TABLE SHOWING THE HOURLY RATE OF CONSUMPTION OF WATER ON APRIL 29TH, MAY 27TH AND AUGUST 10TH

TIME.	APRIL 29.		MAY 27.		AUGUST 10.	
	Rate in gallons per 24 hours.	Percentage of daily average.	Rate in gallons per 24 hours.	Percentage of daily average.	Rate in gallons per 24 hours.	Percentage of daily average.
6- 7 A. M....	1,298,000	100.0	1,343,000	100.0	1,931,000	87.5
7- 8 A. M....	1,499,000	115.0	1,602,000	118.0	2,566,000	116.0
8- 9 A. M....	1,808,000	139.0	1,652,000	122.0	2,692,000	122.0
9-10 A. M....	1,655,000	127.0	1,550,000	114.0	2,764,000	125.0
10-11 A. M....	1,582,000	121.0	1,509,000	111.5	2,860,000	129.0
11-12 A. M....	1,498,000	115.0	1,575,000	116.0	2,841,000	128.0
12- 1 P. M....	1,517,000	116.0	1,608,000	118.5	2,630,000	119.0
1- 2 P. M....	1,533,000	117.0	1,530,000	113.0	2,512,000	114.0
2- 3 P. M....	1,550,000	119.0	1,492,000	110.0	2,642,000	119.0
3- 4 P. M....	1,466,000	112.5	1,505,000	111.0	2,650,000	120.0
4- 5 P. M....	1,403,000	107.5	1,474,000	108.7	2,364,000	107.0
5- 6 P. M....	1,460,000	112.0	1,390,000	102.2	2,615,000	118.0
6- 7 P. M....	1,474,000	116.0	1,447,000	107.0	2,865,000	129.0
7- 8 P. M....	1,325,000	100.2	1,377,000	101.5	2,637,000	119.0
8- 9 P. M....	1,136,000	87.1	1,312,000	96.7	2,221,000	100.0
9-10 P. M....	1,184,000	90.5	1,297,000	96.0	2,064,000	93.5
10-11 P. M....	1,040,000	79.5	1,176,000	86.7	1,870,000	85.0
11-12 P. M....	969,000	74.2	1,130,000	83.3	1,665,000	75.5
12- 1 A. M....	963,000	73.7	1,118,000	82.4	155,000	70.0
1- 2 A. M....	969,000	74.2	1,157,000	85.2	1,493,000	67.4
2- 3 A. M....	963,000	73.7	1,111,000	82.0	1,372,000	62.4
3- 4 A. M....	994,800	76.2	1,040,000	76.6	1,357,000	61.2
4- 5 A. M....	1,033,000	79.2	1,033,000	76.2	1,403,000	63.5
5- 6 A. M....	1,033,000	79.2	1,111,000	81.9	1,550,000	70.0
Average......	1,311,000	....	1,359,000	....	2,217,000	....

From an examination of the preceding table it appears that the winter consumption will range from 1,500,000 to 1,750,000 gallons, with an occasional jump in extremely cold weather to 2,000,000 gallons. About March 1st the amount of water used will begin to decrease and continue to do so until June 1st, when it will reach a minimum of 1,250,000 gallons. From this time it will begin to increase with the advent of the summer population, gradually rising to 2,250,000 gallons irrespective of street, spring and lawn use, which, as shown by the difference between the consumption on fine and rainy days, will raise this daily total by several hundred thousand gallons additional.

These figures are very close to the estimate made in our preliminary report, where it was stated that after metering the regular consumption would amount to about 100 gallons per capita, and the excess for summer residents to 40 gallons per visitor. Assuming a population of 12,000 people and a summer increase of 25,000 people per capita, these estimates are almost exactly borne out by the gagings taken during the past summer.

One hundred gallons is higher than can be legitimately used in a community such as Saratoga, where there are no manufacturing industries. It indicates, now that the services are metered, a considerable leakage from the mains.

Investigation often proves such leakage to be due to a broken pipe or bad joints, and to be concentrated in great part at one or several points. To ascertain if such were the case at Saratoga the village was divided into districts, and one district cut off at a time from the supply, between the hours of 12 p. m. and 4 a. m. The effect in reducing the consumption was, generally speaking, to show that no large leak accountable for the high night rate exists, but that a generally distributed leakage must be held responsible. The figures already given, therefore, may be accepted as the probable future water consumption until such time as a general overhauling of the street pipes takes place.

GAGINGS OF THE FLOW OF SEWAGE

In all sewer systems, no matter how well constructed, there more or less leakage of ground water into the pipes. Whi therefore, the water consumption is a valuable indication of t amount of sewage flow, it was believed to be advisable to measu the actual flow of sewage under present conditions, and a we was constructed in the settling tank at the end of the 36-in sewer for this purpose.

Numerous single observations were taken, and on four da gagings, with readings every fifteen minutes, were taken f twenty-four hours. The following table shows the results these gagings:

TABLE No. 3

TABLE SHOWING THE HOURLY RATE OF DISCHARGE OF MAIN SEWER ON FOUR DAYS

TIME.	MAY 1-2.		JUNE 25-26.		JULY 19-20.		AUGUST 10-11.	
	Rate in gallons per 24 hours.	Percentage of daily average.	Rate in gallons per 24 hours.	Percentage of daily average.	Rate in gallons per 24 hours.	Percentage of daily average.	Rate in gallons per 24 hours.	Percentage of daily average.
7- 8 A. M.	2,408,000	97.0	2,319,000	93.2	2,190,000	97.0	2,606,000	96.0
8- 9 A. M.	2,520,000	101.0	2,638,000	106.0	2,652,000	17.0	3,037,000	112.0
9-10 A. M.	2,740,000	110.0	2,856,000	114.0	2,782,000	123.0	3,140,000	116.0
10-11 A. M.	2,649,000	106.0	2,928,000	118.0	2,770,000	122.0	3,230,000	119.0
11-12 A. M.	2,902,000	116.5	2,902,000	117.0	2,584,000	114.0	3,265,000	120.0
12- 1 P. M.	2,778,000	112.0	2,682,000	108.0	2,505,000	111.0	3,252,000	120.0
1- 2 P. M.	2,708,000	108.9	2,580,000	103.0	2,494,000	110.0	3,123,000	115.0
2- 3 P. M.	2,804,000	113.0	2,591,000	104.0	2,625,000	116.0	3,100,000	114.0
3- 4 P. M.	2,630,000	106.0	2,590,000	104.0	2,480,000	110.0	3,043,000	112.0
4- 5 P. M.	2,610,000	105.0	2,659,000	107.0	2,377,000	105.0	2,960,000	109.0
5- 6 P. M.	2,497,000	100.0	2,734,000	110.0	2,463,000	100.0	2,791,000	103.0
6- 7 P. M.	2,472,000	100.0	2,682,000	109.0	2,332,000	103.0	2,932,000	108.0
7- 8 P. M.	2,487,000	100.0	2,643,000	106.0	2,448,000	108.0	3,182,000	116.0
8- 9 P. M.	2,406,000	99.2	2,640,000	104.0	2,534,000	112.0	3,100,000	114.0
9-10 P. M.	2,440,800	98.5	2,584,000	101.0	2,474,000	109.0	2,931,000	107.0
10-11 P. M.	2,340,200	94.5	2,512,000	99.0	2,190,000	94.0	2,647,000	97.5
11-12 P. M.	2,299,000	92.5	2,454,000	95.0	2,054,000	91.0	2,494,000	91.0
12- 1 A. M.	2,292,000	92.4	2,364,000	90.0	1,931,000	85.5	2,338,000	86.0
1- 2 A. M.	2,256,000	91.5	2,243,000	95.0	1,810,000	80.0	2,517,000	87.5
2- 3 A. M.	2,233,000	90.0	2,061,000	90.0	1,751,000	77.5	2,054,000	76.5
3- 4 A. M.	2,241,000	90.0	1,983,000	83.0	1,706,000	75.5	1,957,000	72.0
4- 5 A. M.	2,240,000	90.0	1,995,000	79.0	1,692,000	75.0	1,912,000	70.0
5- 6 A. M.	2,256,000	90.5	2,002,000	80.0	1,712,000	76.0	1,912,000	70.0
6- 7 A. M.	2,289,000	92.0	2,137,000	80.0	1,921,000	84.0	2,015,000	74.0
Average	2,482,000	....	2,494,000	....	2,265,000	....	2,724,000	....

These gagings of course include all leakages, and in order to make them of value in estimating the probable future amount of sewage to be disposed of it has been necessary to measure the flow in the main sewer and to gage the inflows of obvious leakage, many of which are large in volume and capable of measurement. For this reason many observations of the flow in the main sewer at various points have been made by a Pitot tube, and in this way the relative contribution of the lateral sewers and the capacity which it will be necessary to provide in a new sewer have been ascertained. Subtracting from the quantity of the sewage which passed the weir on the days when 24-hour gaugings were taken, the inflows, which, if a new sewer were built, would not reach the disposal works, it appears that the amount of legitimate sewage is, during the most of the year, a little in excess of the water consumption, ranging from 1,500,000 to 1,750,000, except during the summer months, when it will increase to a maximum of about 2,750,000 gallons.

Measurements have been made of the flow in lateral sewers, and it has been found that in but few of these pipes does the leakage amount to any significant quantity. While a few pipes apparently take considerable ground water, the remainder are in as good condition as in the average system. The greater portion of the present sewage is derived from a limited area between East Congress and Lake avenue along the main sewer, either from leakage or from the concentration of population and hotel property.

We have made frequent personal examination of the present main sewer, and it is only necessary to enter it at any manhole to realize that except in the middle of the summer there is a continuous succession of small inflows of ground water, collar drains and outlets from springs, which made the flow of sewage considerably greater than the amount of water consumed. The sewer is moreover laid at a considerable depth and built of a single ring of brick. At many places it is settled at the crown and spread at the sides, so that it is no wonder that, when the ground water is high, there is a considerable leakage. Designed to carry both sewage and surface water, it was, in order to obtain capacity, ι comparatively steep gradient, which causes it to reach kirts of the village at an elevation considerably lower essary, and one which means additional lift in pumping. ιugings shown in the preceding table were not taken at a rainfall. Readings have, however, frequently been obιt such times since the catch-basins were disconnected ɜ sewers, and it is found that after almost all rainfalls flows over into the stream, and the total flow in main ıen reaches 10,000,000 gallons per 24 hours. This in ı partly due to the entrance of surface water at various nd partly to roof water. There are about 390 roofs with of 16 acres connected with the sewer. Assuming the e rainfall of one-half inch per hour and that all roof ıds its way to the sewer, it would enter the main sewer te of 5,000,000 gallons per 24 hours. It is, therefore, pparent that whatever the method of disposal, all roofs disconnected from the sewerage system. The flow of on August 10th amounted to 2,724,000 gallons, a large and at first thought it would be expected that it must derably diluted by leakage. In order to ascertain this, were taken for analysis, and the following table shows ts as found by tests made at the laboratory in Brockton.

TABLE No. 4

TABLE SHOWING THE RESULTS OF ANALYSES OF SEWAGE

"*Parts per* 100,000"

SAMPLE.	RESULTS ON EVAP.		AMMONIA.				Chlorine.	NITROGENAS.		Oxygen consumed.	Alkalinity.
	Total.	Less on ignition.	Free.	ALBUMINOID.				Nitrates.	Nitrites.		
				Total.	Diss.	Susp.					
August 14, 1901. 6.40 A. M.	32.40	9.80	.4500	.0750	.0500	.0250	4.78	.0601	.0360	.75	20.4
9.05 A. M.	87.60	28.50	3.5715	.4250	.1875	.2375	21.42	.0000	.0000	6.02	33.4
9.15 A. M.	77.20	25.10	3.9480	.3875	.2750	.1125	19.10	.0000	.0000	4.77	28.4
11. A. M.	80.70	33.70	3.7500	.4750	.3500	.1250	15.84	.0000	.0000	6.72	30.4
2.00 P. M.	66.00	26.10	3.0000	.4300	.2625	.1375	11.36	.0000	.0000	4.86	27.8
5.10 P. M.	62.10	25.50	1.7445	.2375	.1000	.1375	9.62	.0000	.0000	4.97	25.2

These figures show a liquid stronger than the ordinary town sewage, and it is apparent that the disposal works must be designed so as to be capable of purifying during the month of August practically 3,000,000 gallons of sewage, strong as is ordinarily met with.

In preparing to dispose of this sewage the first thing to be determined is as to whether a new main sewer should be constructed. In considering this question the fact that the present sewer was designed to carry surface water as well as sewage must be clearly borne in mind. It has a capacity of 35.0 cubic feet per second, while a main sewer for sewage only need not carry more than 8.0 cubic feet per second. A study of the surface drainage of Saratoga has been made, and it is clearly evident that the village brook is not capable of handling the surface water which in time of storm will reach it, should all connections by which surface water now reaches the main sewer be broken.

The capacity of the village brook channel at the several points, where measurement could be made, is given in the following table:

TABLE No. 5

TABLE SHOWING THE CAPACITY OF BROOK CHANNEL AND AREAS DRAINED

Section.	Area of drained acres.	Capacity of Brook Channel, cu. ft. per second.
Putnam and Phila	395	85.7
Putnam and Caroline	415	70.0
Spring avenue and York	550	64.5
Spring avenue and Circular	625	64.5

Without entering into a discussion of the elaborate calculations which have been made of the surface run-off, and the studies of actual rainfall as recorded at Albany, it will be sufficient for our present demonstration to assume a rainfall at the rate of one inch per hour—which is certainly not unusual. Supposing that one-half of the rainfall finds its way to the brook channel, then for each acre of drainage area there will be a discharge of one-half a cubic foot per second, and if comparison is made of the area drained and the capacity of the brook channel, as shown in the preceding table, it will be evident that this channel has less than one-half the necessary capacity to carry off the discharge of the assumed rainfall. That trouble has not occurred in the past has been due to the fact that the 36-inch main sewer, with a capacity equal to about one-half that of the brook, has been an important outlet for surface water. If, therefore, surface water is prevented from entering the present sewer another conduit to supplement the brook channel will have to be constructed. As a sewer for sewage alone will be cheaper than a new conduit for surface water, and as considerable lift-in pumping can be saved by its construction, it appears, from all standpoints, that it is advisable and economical to build a new sewer as a preliminary to the disposal of the sewage.

MAIN SEWER

The interceptor (see Plate 2) will start at East Congress street. From estimates of the contributing population and gaugings of flow made with the Pitot tube it has been found that about 22 per cent of the total flow enters the sewage at East Congress street, 40 per cent at or above Spring street, 70 per cent at or above Phila street, 85 per cent at or above Lake avenue, and the range in size of pipe has been designed to meet these percentages. The sewer is planned to carry 4,000,000 gallons when flowing two-thirds full. The grade is .125 per cent, and uniform throughout, starting at the elevation of the present sewer at East Congress street and gaining, because of its flatter gradient, about seven feet on the old sewer at East avenue. A 15-inch vitrified pipe is to be laid from East Congress street to Spring street, 18-inch pipe between Spring and Phila streets, 20-inch pipe from Phila street to Pavilion place and 24-inch pipe from Pavilion place to the end.

Manholes are to be placed at all street intersections, and oftener wherever the distance would otherwise exceed 400 feet. The cost of intercepting the present laterals will be small, and the grades of the new interceptor will not interfere with the present main sewer.

It is not believed that at the proposed depths much water will be encountered, but should this occur a 4-inch underdrain, to be discharged at frequent intervals into the present main sewer, should be laid to insure good work and tight joints, which, where sewage purification is to be undertaken, are doubly important.

The estimated cost of the new interceptor is as follows:

Excavation	$4,950 00
Pipe and laying	6,043 40
Manholes	1,210 00
	$12,203 40
Fifteen per cent for lateral connections and contingencies	1,830 50
Total	$14,033 90

DISPOSAL POSSIBILITIES, TOPOGRAPHY AND AVAILABLE FILTERING MATERIALS

At the time of writing the preliminary report in 1899 two locations, which it was believed possible to reach by gravity, were pointed out for soil examination. The first, known as the Miller property, extends along the west bank of Village Brook from Lake avenue towards Union avenue; the other is located north of the Boston and Maine railroad and west of the Schuylerville road. After a more detailed examination it now appears that these are the only two areas worthy of any consideration upon which the sewage can be discharged in whole or in part by gravity. The material found on the Miller property is a gravelly sand, containing more or less clay; that at the railroad territory is a very fine sand, in grain averaging about .10 millimeter "effective size."

It was estimated in our earlier report that an area of 30 acres would be required at the first location, and 40 acres at the second. On a brief consideration of the question it was then stated that sewage could be discharged by gravity at elevation 245, on either of these locations, and that below this elevation the necessary area could be obtained at the Miller property, while at the railroad location, pumping of at least a portion of the sewage would be necessary. When, however, the height required for the installation of septic tanks and for economical distribution of the sewage is worked out, it appears that the main sewer must reach the disposal area at an elevation at least ten feet above the finished surface of the proposed beds. This, in the case of either of the above-mentioned areas, is practically impossible, and it must therefore be concluded that if sands in natural position are to be used the sewage must be pumped.

There are, however, other reasons for this conclusion. In the first place the gravity outfall sewer would in either case be about the same length, and will cost 50 per cent more than a force main; in the second place the materials which are to be found in the areas attainable by gravity are in the one case discounted by the clay present, and in the other by extreme fineness—not to an extent which makes their use impossible, but sufficiently to make their use uneconomical if better sands can be obtained at any reasonable elevation. There might be, moreover, some objection to the location of disposal works extending towards Union avenue, and it therefore appears from all standpoints that pumping must be resorted to if sands in natural position are to be used.

The alternative is an artificial high rate plant, located somewhere in the valley. This possibility we have carefully considered, and have figured out the cost of a plant similar in design to the one constructed at Mansfield, Ohio, and capable of disposing of a maximum of 3,000,000 gallons of sewage per day—the filters to operate at a rate of 500,000 gallons per acre. Such a plant, including, as it does, the septic tanks and six acres of filters, cannot well be located nearer the village than Eureka Springs, or a distance of about 7000 feet below East avenue. About eight acres of land would be required, and an examination of the topography of the valley within the limits of a gravity outfall will indicate that it is not an easy matter to obtain this area. Either expensive side-hill excavation or costly foundations on the intervale land are the alternatives.

attention and less capable of satisfactorily meeting the al variation in the quantity and quality of the sewage to with in Saratoga.

ıvestigation of the higher territory north of the Boston ine railroad and east of the highway which runs past the ıs property (see Plate 1) has been made. The area has refully surveyed, and about 100 test pits have been sunk tudy of the soils.

›ut entering into any long discussion of the available ls, it may be said that there are about eight inches of vo feet of sub-soil and underneath this sand, which in all lities necessary for filtration is very satisfactory. The size averages about .25 millimeters, and the co-efficient ›rmity about 2.0, indicating a sand sharp and uniform —better than the material in most of the beds at Brockl comparing favorably with those of any filtration area to the writer.

of the borings were sunk 16 feet without reaching the the sand or finding water—conditions which make the y under-drainage low in cost and which guarantee a high f purification. The only undesirable feature is the depth oil which must be removed to expose the sands. This is, no greater than was the case at Brockton, and not suffioffset by the advantages to be found in the better materials and in the lower cost of operation at the higher location.

The development of power at Spier Falls, and its electric distribution, is of particular value in the present problem, and makes the pumping of the sewage particularly feasible. We are informed that it is the intention to sell power at about two-thirds the cost of its development by steam, and the yearly charges will accordingly be low. As will be more fully described in a later paragraph, it is proposed to so equip the station that the operation of the pumps will be practically automatic, requiring only such attendance as can readily be given by the present engineer of the water works station.

The actual lift from the elevation of the new interceptor at East avenue to the surface of the liquid in the septic tanks will be 15.0 feet, and the total lift when pumping the maximum amount of sewage will not exceed 40 feet. It is therefore proposed to use centrifugal pumps, which are particularly well fitted for direct connection to electric motors, and not only cheap in first cost, but capable of pumping sewage from which nothing has been removed by screening except large sticks and similar objects.

It is proposed to pump continuously day and night, thus greatly reducing the size of force-main and avoiding the necessity for a storage reservoir at the pumping station, the use of electric power making this possible because of its automatic operation.

RESERVOIR AND PUMP WELL

The pumping plant is located on Spring avenue, a short distance east of East avenue, in the property of the Boston and Maine railroad. At this point a small reservoir and pump well are to be constructed. The sewer ends in a gate chamber, by which the sewage can be turned either into the pump well or, in case of accident, diverted to the present main sewer.

The pump well is 11 feet long, 10 feet wide and 7 feet deep below the invert of the main sewer. The reservoir is circular in form, 25 feet in diameter, and of the same depth as the pump well. The sewage before entering the pump well passes through a screen of iron bars spaced 2¼ inches on centers, and designed to remove merely sticks and stones, which might injure the pumps, and allow all other solid matters to pass. It will demand little attention and can be made automatic by the installation of a mechanical rake.

The sewage can only enter the reservoir from the pump well through an overflow at elevation 259.00; it flows back through a pipe with check-valve. The object of this arrangement is obvious—namely, to cause the sewage to stand as high as possible at all times in the pump well and so to reduce the pump lift, the reservoir only coming into use when the inflow from the sewer exceeds the pump rate. The total storage capacity of pump well and reservoir, when filled to elevation 259.00, is about 40,000 gallons, or equivalent to a 20-minute discharge of the main sewer at the time of maximum flow. This storage capacity will serve to make automatic pumping feasible and safe. To insure against accident, it is proposed to construct an overflow pipe from the reservoir to the present main sewer, and to install a teleometer in the water works station which will at all times show the height of the sewage in the reservoirs. An overflow will never occur except in case of accident, and it is therefore not a matter for consideration from a sanitary standpoint.

The entire well and reservoir is to be constructed of concrete. The estimated cost, including the foundations of building, is as follows:

Excavation	$251 00
Masonry	964 71
Iron work—gates, covers, screens	500 00
Overflow pipe	185 00
Total	$1,900 71

PUMPING MACHINERY

It is proposed to lift the sewage with centrifugal pumps driven by electric motors, the power to be obtained from the Spier Falls company, if the rates are lower than would be the cost of power developed by placing dynamos in the present water works station. In our estimates it will be assumed that this will be the case.

The normal flow of sewage will be about 1,500,000 gallons, this amount increasing in the summer season to about 3,000,000, or practically doubling. It is therefore planned to install three pumps, each with a capacity when running at its regular rate of 1,500,000 gallons, but capable of economically operating with a discharge 25 per cent either way from its nominal rating. It is proposed to use direct-current motors made by C. & C. electric company, equipped with the "Series Parallel" method of control, and arranged with double commutators in such a way that by field regulation a number of different speeds can be obtained without serious loss of efficiency. This speed variation is to be automatically effected by floats attached to the lever of the controller. In this way when the reservoir is full the pumps will run at one speed, when it is empty at another speed, the latter to be such that the discharge will then be a little less than the minimum inflow of sewage. With this arrangement the motors will automatically accommodate their speed to the hourly variation in flow of sewage and the reservoir will serve as a balance, or insurance against accident.

It is proposed to install three 6-inch centrifugal pumps and three 15-kilowatt electric motors. In summer two pumps will be operated instead of one, and the speed will be similarly varied, the battery of motors and pumps being so arranged that any one or any two can be run, the third pump and motor always to be held in reserve.

Continuous pumping has not as yet come into general use in cases similar to Saratoga, because where attendance is necessary it is cheaper to provide storage of the night flow and pump only during the day. Where electric power can be cheaply obtained, and where the conditions are such as to make only occasional attendance necessary, continuous pumping is most economical because of the decreased size of the force main and friction head to be overcome in pumping. All the piping about the pumps is designed to reduce friction to a minimum, and valves are provided in the suction and force main connections so that any pump can be cut out for repairs. The estimated cost is as follows:

Three motors	$1,545 00
Speed regulators and installation of machinery	450 00
Three centrifugal pumps	1,050 00
Piping and specials	300 00
Gates	440 00
	$3,785 00

PUMPING STATION

It is proposed (see Plate 4) to place the pumping station 60 feet back from the south line of Spring avenue, and to purchase a lot of land 200 feet by 121.5 feet with an area of about .56 acres.

The pumping station will be 23 feet by 28 feet inside dimension. It will in part project over the pump well, and this part of the building is to be closed off from the pump room by a brick partition.

The station is designed to be built of limestone, laid random ashlar, with a 4-inch brick lining, the roof to be covered with red tiling. The building and surroundings will form a decided addition to the landscape, and its interior with sheathed ceiling, hard wood floor and machinery, will be in everyway clean and attractive, and not in the least degree suggestive of the liquid which it is designed to handle. The estimated cost of the building is $1800.

FORCE MAIN

The force main (see Plate 5) is to be 16 inches in diameter. It will follow Spring avenue to a point beyond the Excelsior Springs hotel, where it will turn easterly and pass through private property to the disposal fields. The area of private land necessary to take is about 4.5 acres. The pipe line will be on high ground and the trench work accordingly inexpensive. The gradient is planned in such a way that there is only one low point and one high point between the pumping station and septic tanks. At the low point a blow-off (see Plate 5) will be constructed, and by its use and the blow-off at the pumping station the entire pipe line can be emptied. At the high point an air vent (see Plate 5) will be constructed by putting in a branch with vertical riser extending above the hydraulic gradient. In this way all air and gases can readily escape without the use of any mechanical apparatus, which, where sewage is to be handled, is apt to stick and refuse to work.

In order that the pipe may be drained it is necessary to lay it on a grade line, and for this reason two open cuts will be made through mounds which are encountered, and the material used in making an embankment across the gully. The line is laid on easy curves, and so as to intersect private property to the best advantage.

There will be but little pressure on the pipes at any time, and the lightest pipe obtainable should be purchased. It ought not to weigh more than 100 pounds per running foot. The estimated cost of the force main and appurtenances is as follows:

Pipe line (16-inch) 8550 feet	$15,817 50
Excavation in open cut	875 00
Air vent and blow-off	150 00
Culverts	200 00
Total	$17,042 50

TANKS

It is proposed to locate the septic tanks (see Plates 6 and 9) at the disposal area. With continuous pumping this is possible; while if the pumps were run only during the day, as at Brockton, the tanks would necessarily be located at the end of the main sewer. The total capacity is to be 1,000,000 gallons, divided into four units (see Plate 7). There is as much danger from a too long as a too short septic action, and the division of the tanks into units, any one or more of which can be cut out of use, is to make it possible to regulate the capacity of the tanks to the amount of sewage flowing.

During the summer all four units will be used, and the time of septic exposure will vary from 8 to 12 hours. This is a somewhat shorter time than is usually recommended, but as anaerobic liquefaction is the most active in the warmer months it is believed that the collection of solids will not be in excess of the bacterial capacity. Eight hours is sufficient to deposit all the solids, and there will be no greater amount of suspended matter in the effluent than there would be after a longer exposure. Furthermore, it is to be borne in mind that some septic action in the sewer and force main has already taken place.

In winter the raw sewage will be passed through two tanks and the other two used as storage tanks to hold the night flow so that no sewage will be applied to the beds at night.

The tanks (see Plates 7 and 8) are to be entirely constructed of concrete, except the piers which are of brick. The roof is built with groined arches (see Plate 7) and the floor is an inverted groin.

The sewage enters each unit through four pipes at a depth of 2.5 feet below the level of the liquids in the tanks, and the effluent escapes through 96 2-inch pipes to the orifice chamber, whence it flows over a weir, the crest of which is set three inches below water level in the tanks. The object of the four-way inlet and the multiplex outlet is to insure a uniform velocity over the entire section of the tanks, enabling the sewage to enter each arched corridor and deposit its suspended matters uniformly over the bottom. The solids after a time rise to form a surface scum, and upon the regularity of this surface covering depends the success of the tanks.

A by-pass from the chamber at the end of the force main around the tanks to the aerator is arranged so that sewage can, if desired, be taken directly to the beds.

Septic effluent is entirely devoid of free oxygen, and before application to the filters it is necessary that it be aerated. For this purpose a special form of chamber has been designed, which it is believed will effectively provide the required aeration. The effluent runs from the orifice chamber through a 15-inch pipe which is turned down into a 24-inch pot, over the lip of which the effluent flows uniformly on to a series of perforated sheet-iron plates, passing from one to another until it reaches the level of the liquid in the 24-inch pipe leading to the filters.

The estimated cost of the septic tanks and appurtenances is as follows:

Concrete masonry	$11,495 22
Brick masonry	1,670 55
Gates and covers	990 00
Piping	329 00
Aerating chamber and iron work	750 00
Total	$15,234 77

FILTER BEDS

The disposal field (see Plates 6 and 9) has been located just east of the highway. There is sufficient area of suitable soil in the back land, but if the beds are moved further east the additional length of force main will cost more than the increased value of the land adjacent to the road. As already described, there is a depth of about two feet of sub-soil to be removed. This will be placed in the enbankments which (as shown on Plate 9) are higher than would otherwise be necessary. The field is divided into 20 beds, 18 about one acre in area and the other two about one-half acre each. After removal of the sub-soil the underlying sands must be graded by cutting in some places and filling in others. In doing this, care must be taken that material of different sized grain be not thrown together, and experienced superintendence will be necessary to obtain the desired results.

Successful filtration demands thorough distribution of the sewage, and also that the sewage shall be applied intermittently in doses and at such rates that the entire area of the bed will be covered. As it is proposed to pump continuously it is necessary to provide some means of applying the sewage intermittently to the beds. In day time, when the flow is sufficient to insure good distribution, gates can be shifted by hand, but when the pumps are running slowly it is necessary to apply the sewage more quickly than the rate at which it reaches the septic tanks. To accomplish this an automatic dosing apparatus and tank has been designed which will not only apply the sewage intermittently and at a rate capable of effecting distribution, but also will shift the flow through a cycle of four beds without attendance, giving each bed its dose in proper turn. It is arranged so that any four beds on the field can be dosed in this manner, and it can be used not only at night, thus entirely doing away with the necessity for night attendance, but also in the day time, in this way enabling the gate tender to do other labor.

The ideal method of dosing filter is to frequently apply small quantities at a high rate. This the apparatus proposed will do, and by its use the only drawback to continuous pumping, namely, the necessity for night labor at the field, will be removed.

The dosing tank, which is a structure 26 feet long, 14 feet wide and 4 feet high, is located in the center embankment 180 feet from the aerating chamber. In the center of this tank a cylinder with four 12-inch circular openings in its circumference is set, and in this another cylinder, fitting closely, and with one opening, revolves. Through the floor of the dosing tank an 18-inch pipe connects with the bottom of the first mentioned cylinder, thus permitting the sewage to escape from the tank into the cylinder and out through the side opening, with which the opening in the revolving gate at the time coincides. The side openings are connected with corner chambers, pipes lead to the different beds. When the septic effluent enters the dosing tank it has no outlet, as all gates are closed. As it rises to the height necessary to accumulate the desired size of dose a float is lifted, tripping the cam which holds down the main float and permitting the float to spring up and revolve by gearing the cylindrical gate one-quarter turn. At the upper limit of its motion the main float lifts the plug valve and the accumulated dose of septic effluents escape to the desired bed. As the liquid falls the floats settle back to place—the bottom valve finally closing when the tank is empty. Provision is made for passing sewage to the beds directly without using the tanks, and an overflow is provided by which the effluent can reach the beds in case of any accident. The size of dose which will be discharged by the automatic apparatus can be regulated by setting the releasing float at different heights. With a full tank the dose will vary from 25,000 to 40,000 gallons, depending on the rate of inflow during the time

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The estimated cost of the septic tanks and appurtenances is as follows:

Concrete masonry	$11,495 22
Brick masonry	1,670 55
Gates and covers	990 00
Piping	329 00
Aerating chamber and iron work	750 00
Total	$15,234 77

FILTER BEDS

The disposal field (see Plates 6 and 9) has been located just east of the highway. There is sufficient area of suitable soil in the back land, but if the beds are moved further east the additional length of force main will cost more than the increased value of the land adjacent to the road. As already described, there is a depth of about two feet of sub-soil to be removed. This will be placed in the enbankments which (as shown on Plate 9) are higher than would otherwise be necessary. The field is divided into 20 beds, 18 about one acre in area and the other two about one-half acre each. After removal of the sub-soil the underlying sands must be graded by cutting in some places and filling in others. In doing this, care must be taken that material of different sized grain be not thrown together, and experienced superintendence will be necessary to obtain the desired results.

Successful filtration demands thorough distribution of the sewage, and also that the sewage shall be applied intermittently in doses and at such rates that the entire area of the bed will be covered. As it is proposed to pump continuously it is necessary to provide some means of applying the sewage intermittently to the beds. In day time, when the flow is sufficient to insure good distribution, gates can be shifted by hand, but when the pumps are running slowly it is necessary to apply the sewage more quickly than the rate at which it reaches the septic tanks. To accomplish this an automatic dosing apparatus and tank has been designed which will not only apply the sewage intermittently and at a rate capable of effecting distribution, but also will shift the flow through a cycle of four beds without attendance, giving each bed its dose in proper turn. It is arranged so that any four beds on the field can be dosed in this manner, and it can be used not only at night, thus entirely doing away with the necessity for night attendance, but also in the day time, in this way enabling the gate tender to do other labor.

The ideal method of dosing filter is to frequently apply small quantities at a high rate. This the apparatus proposed will do, and by its use the only drawback to continuous pumping, namely, the necessity for night labor at the field, will be removed.

The dosing tank, which is a structure 26 feet long, 14 feet wide and 4 feet high, is located in the center embankment 180 feet from the aerating chamber. In the center of this tank a cylinder with four 12-inch circular openings in its circumference is set, and in this another cylinder, fitting closely, and with one opening, revolves. Through the floor of the dosing tank an 18-inch pipe connects with the bottom of the first mentioned cylinder, thus permitting the sewage to escape from the tank into the cylinder and out through the side opening, with which the openng in the revolving gate at the time coincides. The side openngs are connected with corner chambers, pipes lead to the diferent beds. When the septic effluent enters the dosing tank it has no outlet, as all gates are closed. As it rises to the height necessary to accumulate the desired size of dose a float is lifted, ripping the cam which holds down the main float and permitting he float to spring up and revolve by gearing the cylindrical gate ne-quarter turn. At the upper limit of its motion the main oat lifts the plug valve and the accumulated dose of septic ffluents escape to the desired bed. As the liquid falls the floats ettle back to place—the bottom valve finally closing when the ank is empty. Provision is made for passing sewage to the beds irectly without using the tanks, and an overflow is provided by which the effluent can reach the beds in case of any accident. The size of dose which will be discharged by the automatic aparatus can be regulated by setting the releasing float at different eights. With a full tank the dose will vary from 25,000 to 0,000 gallons, depending on the rate of inflow during the time

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of discharge. It will escape from the dosing tank at about 4000 gallons per minute, and the time of applying the dose will therefore be from 10 to 15 minutes, including the emptying of the pipe.

From the chambers at the corners of the dosing tank four lines of pipes will be laid through the embankments running east and west between the filters. Opposite the center of the beds gate-chambers will be constructed and provided with gates, so that the sewage can be turned on to any bed in the field. These main distributors and the outlet pipes are all designed to be capable of carrying eight entire feet per second, which is the rate of discharge of the automatic apparatus. In this way rapid application of the sewage will be insured. To effect thorough distribution over the beds it is planned to build carriers of the same type as are in use at Brockton in each bed.

As already stated, the ground water is situated about 20 feet below the surface of the beds, and a large part of the filtered sewage will accordingly pass down to this level and find an outlet through natural channels independently of any underdrains which might be constructed. The drainage system has therefore been designed as an insurance against dangerous elevation of the present water table rather than with the idea that it will carry off all the effluent. Accordingly only one line of 6-inch and 8-inch pipe has been placed at a depth of about 6½ feet in each bed, running through the center and discharging into a series of manholes in the middle of the field. These manholes are connected by a main underdrain at a depth of about 10 feet below the surface of the beds. This drain, which gradually increases from 10 inches to 15 inches in diameter, passes through the embankment south of Bed 16, and thence follows the highway to the Boston and Maine railroad, along which it will run to the brook.

The maximum quantity of sewage which it is anticipated will ever require purification will be about 2,700,000 gallons. Assuming that two acres are out of commission for weeding or other exigencies of management, it appears that the maximum rate of filtration will be about 175,000 gallons per acre. With proper management there will be no difficulty in maintaining this rate through the summer months. In winter the maximum rate will not exceed 100,000 gallons per acre. Experience has proved that sewage can be successfully purified during the coldest weather; it is only necessary to furrow the surface of the beds so that ice will form and bridge the trenches, in which the liquid will continue to find its way without trouble into the sands.

It is always desirable to remove snow from the carriers so as to maintain the temperature of the sewage at as high a degree as possible until it reaches the surface of the beds. Large doses, applied intermittently, are sometimes desirable in winter, and if this should prove the case at Saratoga two of the septic tanks may be used to store the night flow, applying it quickly during the day, and thus making unnecessary the application of any sewage at night. The estimated cost of the filter beds and appurtenances is as follows:

Excavation (including that necessary for septic tanks)	$18,000 00
Dosing tank, apparatus and connections	2,000 00
Distributing pipe, outlet pipes and carriers	8,599 20
Underdrains	4,713 99
Total	$33,313 19

MAINTENANCE OF THE DISPOSAL WORKS

We have been informed that it is the intention of those promoting the Spier Falls project to furnish power at about two-thirds of the cost when developed by independent steam power.

At the water works station the cost, including interest charges, was in 1900 about 2½ cents per actual or brake horse power hour. Dynamos can be installed at this station in the back portion of the building, and so long as day and night pumping is continued, or until such time as a reservoir is constructed to hold a supply of water and thus do away with the night gang, power can be furnished for pumping sewage without practically any increase in the labor charges. Assuming a coal consumption of eight pounds per horse power hour, the cost, including an increase of

$250 for the chief engineer because of increased responsibility, would not exceed two cents per kilowatt hour. Therefore, it would appear that power must be furnished from Spier Falls for at least this price in order to justify its use, and the pumping will accordingly be estimated on this basis.

It is proposed that the chief engineer of the water works shall be given charge of the sewage pumping. The machinery will not require more than a brief examination each day, and an occasional removal of the screenings which can be readily burned under the boilers at the water works station. This is done without trouble or annoyance at Brockton, and the proposed screens for Saratoga are much coarser and only intended to remove the largest objects.

The average actual power required in lifting the sewage will be about 13 kilowatts, which, at the estimated cost of two cents per hour, will amount to a yearly charge of $2,277.60.

Two men should, in view of the proposed automatic dosing apparatus, be capable of handling the disposal area, and it is therefore estimated that the total yearly cost of maintaining the disposal works will not exceed $3500.

RESUME AND SUMMARY OF COST

It is estimated that by disconnection of the roof drains and the construction of a new sewer, the amount of sewage which will require purification can be reduced to a normal flow varying from 1,500,000 to 1,750,000 gallons, with a summer increase to a maximum of 2,750,000 gallons.

It is recommended that a new sewer be constructed from East Congress street to a point on Spring avenue, a short distance east of East avenue. It is concluded, after considering the quality of the soils and the extent and location of the areas which can be reached by gravity, that pumping is advisable because of the very suitable sands and desirable location which can thus be obtained.

It is recommended that a small equalizing reservoir, pump well and station be located on Spring avenue, in the land of the Boston and Maine railroad company; that three centrifugal h of 1.500.000 gallons capacity be installed, these e operated by electric power taken from Spier Falls nd automatically started, stopped and regulated in ats, so as to make attendance practically unnecessary. ommended that a 16-inch cast-iron force main be laid osal works.

ommended that the sewage be subjected to a prelimi-ment, in septic tanks, to be located at the disposal e property at present owned by Wyble & Van Every, e Boston and Maine railroad and east of the highway. sed that these tanks have a capacity of 1,000,000 gal-ided into four units, that four be used in the summer nks, in the winter two, the other two tanks being used e night flow.

ommended that about 20 acres of sand filters be pre-t the sub-soil and loam be removed and placed in the nts; that the sewage be aerated after septic treatment; tomatic dosing tank be installed; that carriers be con- each bed, and that the field be underdrained by a ipes—one in each bed—to be laid at depths varying ten feet.

nated cost of the proposed work is as follows:

g sewer	$12,203 40
vell and building foundations	1,900 71
lant	3,785 00
	1,800 00
n	17,042 50
ks	15,234 77
s	33,313 19
	$85,279 57
g, land and contingencies, 15 per cent	12,791 93
	$98,071 50

of land has been purposely omitted from the esti-e difference between the actual value of property and we believe that the disposal of the sewage direct into the creek at the points selected will cause no nuisance even should the village more than double its population.

There are five points of disposal of the sewage into the Esopus creek rendered necessary by the existing contour of the ground. The outlets from the Lower Dock road and Ferry street will now and for all future time carry very little sewage; their construction would not be contemplated in the immediate future, since the sewers for which they furnish outlets have only four adjacent dwellings, and no manufactories. The total length of their sewer system is about 3000 feet. The three other outlets or points of disposal are the ones contemplated for immediate construction and each drains a considerable territory.

These outlets are the one from Ripley street, the one at the lower end of the Lower Dock road outlet, emptying at the old upper dock, and the one at the lower end of East Bridge street.

The outlet from Ripley street empties its sewage just below the paper mill dam, and the plans contemplate changing the lip of the dam—by either adding to the height of its south portion or decreasing that of its north portion—so that the overflow, in time of extreme low water, will be from the north end, and thus afford a means of conveying the sewage emptied just below that end down the stream to the tidewater. There being only a few inches difference in the elevation of the northerly and southerly portions of the lip of the dam, the dam can be very readily and easily arranged to overflow in this manner. It should be stated that the dam is of timber on a rock foundation, and the alterations required can be made by bolting or spiking to its lip a sufficient number of plank to effect the desired end. This can be done without hindering the use of or affecting its water power privileges.

The two other points of disposal are into the tidewater, one on the north side of the creek at the old "upper dock," situated at the east end of the Upper Dock road, and the other at the foot of East Bridge street near the steamboat landing.

The outlet at Ripley street, and the one at the old "upper dock," are above the point where the water from the tail-race of the mills enters the creek. The other outlets are below.

While there may be times in each day, during extreme dry weather, when little or no water flows over the dam, it is considered that the leakage from the dam, which is very considerable, and the overflow of the dam at night, or at such periods as the water may not all be consumed by the mills, will afford sufficient dilution and flushing to the stream as to prevent the creation of any nuisance.

The water of Esopus creek is carried by two parallel United States government dikes of nearly half a mile in length out to deep water in the Hudson river. The dikes were built in 1892, the waterway between them being 260 feet wide. The purpose of the dikes is to contract the channel, to promote scour and to maintain the improved navigable depths during the low stage of summer. The inner harbor, west of the shore end of the dikes, has been also improved by dredging so as to afford a suitable channel and harbor for steamboats. The results obtained by the government work have been effective in supporting the condition of the channel between the dikes, as well as of the inner channel or harbor of the creek, and it is our opinion that deposit of matters liable to cause a nuisance will not occur. The experience at Milwaukee, Wisconsin, where the pumping of only twenty-five times the volume of the sewage of water from Lake Michigan into a quite small channel effectively caused by an increased velocity a dilution of the sewage, a cessation of putrefaction, the removal of discoloration from the river water and an abatement of the previously existing nuisance, would bear out the above opinion.

The mouths of the sewers where they enter the creek are designed to empty below the surface of low tide. The range of tides is approximately four feet, and sets back up the creek several hundred feet above the outlet of the "upper dock."

The system contemplates the conveying of the street surface water at such points in the village where the interests appear to require it. In those sections where the surface water finds a ready course to the numerous small brooks in the village, surface water is not cared for by the sewers.

Numerous borings made in the early part of April in this year to determine the character of the sub-soil demonstrated that the small sizes of pipe needed. There are nearly 13 miles of sewers in the complete system, along which there are nearly nine miles of trenching and back-filling under eight feet deep, nearly four miles of which are under six feet.

The small sizes of pipe which are not generally intended to carry surface water are necessarily considerably larger than any theoretical estimate of the sizes required to carry the sewage would make necessary, and it is for the purpose of keeping clean such pipe that the construction of the 43 flush tanks is recommended for the system. These flush tanks empty automatically, and as often daily as required and adjusted. The admission of roof water into the sewers is not contemplated, but might be allowed in a few places for flushing the upper ends of the system until such time as the use of those sewers would render unnecessary the admission of roof water. Any permit to connect a roof with the system should contain a clause giving the village the right at any future time to require the connection severed. The admission of roof water might be especially desirable for a time at the few ends of the system where the depth of trench is not sufficient for the insertion of flush tanks, or where the water mains are not sufficiently convenient for the supplying of water to the tanks. There are designed for the system 55 lampholes, into each of which a hose can be inserted for flushing when necessary. These lampholes are used in the place of manholes for the purpose of inspection to save the expense of the more costly manholes. They are placed only at the extremity of some of the lines or between two manholes. The flush tanks are also designed with an overflow which answers the purpose of a lamphole. Through the lamphole there is thus obtained at any time perfect inspection of the entire bore of the sewers, since either a manhole or a lamphole is placed at every change of grade or alignment.

In the caring for storm water or surface water it is contemplated to relieve in general only those portions of the village which do not now and cannot eventually drain their streets by convenient short sewers direct into the various small brooks of the village or into Esopus creek. Small portions of the village are already supplied with surface water sewers more or less satisfactory in operation. The territory for which the proposed system is intended to provide street drainage covers 150 acres. The carrying capacity of the sewers receiving surface water is 12,000,000 gallons per day, and while they are not intended to provide for excessive storms they will carry, without running under pressure, at an average of nearly 300,000 gallons from each street inlet.

On account of the houses on the south side of Valley street being extremely low it has been deemed desirable to provide a sewer for those houses extending from Mill street up the ravine between Valley and Burt streets, toward Barclay.

On the Ulster avenue outlet line it will be noticed that the plans contemplate three inverted siphons under the streams crossing this line and a tunnel line through the Washburn hill. This outlet line is a necessary line for the sewering of the westerly end of Ulster avenue, Elizabeth street, part of Livingston and the westerly end of Main street.

The outlet line from Washington avenue to the creek near the eastern end of the Upper Dock road is divided on the plan into two outlets—the one called the Washington avenue outlet, which extends from Washington avenue around to the east, crossing Main street and down to the Lower Dock road, and the Lower Dock road outlet as an extension to the Washington avenue outlet. This line, in addition to caring for the sewage of a large portion of the eastern part of the village, renders unnecessary the long and deep cut through the Main street hill for that portion of the village north of Main street and east of Elm street. Borings taken in numerous places north of Main street and east of Elm, demonstrated, on account of the presence of water and fine sand, that a long and deep cut through the Main street hill would be very expensive.

The three blocks of Montgomery street between West Bridge street and Partition street require no sewer, since they are short blocks and have their houses facing on the four streets crossing Montgomery street, these four streets being provided with sewers.

A sewer is not provided for the entire length of Simmons street, inasmuch as in addition to being a private street, it is largely outside of the corporation—the corporation line in that section crossing through the intersection of Kingston road and "The Triangle" diagonally through the cemetery and Simmons street.

Respectfully submitted

KNIGHT & HOPKINS
Civil Engineers

SUPPLEMENTAL REPORT ON SAUGERTIES SEWAGE TREATMENT WORKS

In accordance with the requirements of the State Department of Health, plans and specifications are prepared providing for the treatment of the sewage at the Ripley street outlet, at the Upper Dock road outlet (at the old upper dock) and at the lower end of the East Bridge street sewer.

On account of the present number of dwellings on the outlets of the lower end of the Lower Dock road and of Ferry street being only four, and the total length of their sewers being about 3000 feet it is assumed that treatment works are not required for those sewers.

It is proposed to treat the sewage flowing to the three outlets first mentioned by the septic tank process, and the plans proposed are considered susceptible of additions or extensions later to provide a greater degree of purification if such may be required by the State Department of Health. It is probable that on account of the limited area of land at a suitable elevation that can be found or obtained at these outlets, some chemical process would be the one to be adopted if further purification should be required later and it were deemed expedient to utilize one or more of the present sites for that purpose rather than combining the sewage at the East Bridge street site and carrying it from thence to the Hudson river by way of Ferry street.

The estimated total cost of the three treatment works, exclusive of the extra cost of the land required over that necessary for the sewer outlets, is $8600, and in the consideration of the several problems that arise, the probability of further treatment being required only at a long time in the future with the indefiniteness of just what kind of further treatment might be best suited to the conditions that would then obtain, it has been considered that it would be wiser for the village at the present time to construct the three separate works at the limited cost, and later abandon one or all of them if necessary in the combination of those works into two or one plant for a more refined mode of disposal. This would be especially true if the cost of operation of the three septic tanks shall not be appreciably greater than if the three were combined into one septic tank; and this is self-evident, since the cost of operation is practically limited to the expense of pumping out and removal of the sludge.

To combine the Ripley street plant with that at the upper dock would involve, in addition to the sewer and accessories, a long tunnel line in rock besides a great deal of rock excavation not in tunnel. The estimated cost of this line is $9100, from which should be deducted the saving by combining the treatment works, estimated at $1700, leaving $7400.

To carry all of the sewage to the East Bridge street works can be done either by two lines across the creek or one line from the Ripley street works to the Upper Dock works and thence across the creek. On account of the probable difficulty of obtaining a crossing above the dam without legal difficulty the line last outlined appears the most feasible, the estimates of cost of the two not differing greatly. The line from the upper dock to the East Bridge street works we estimate to cost $5800, exclusive of rights of way. This, exclusive of rights of way, with the $9100 above, gives $14,900 as the construction cost of uniting the sewage at the East Bridge street site. To this must be added the cost of septic treatment works at this latter place. Such works would cost about $6500—making a total to this point of $21,400. To carry the sewage to the Hudson river with the septic treatment works there instead of at or near the East Bridge street site would cost the additional sum of about $8500, making a total of $29,900. If the rights of way for this entire line were estimated at $2100, the cost of treatment works at the Hudson would be $32,000, as against $8600 as proposed by the plans. Since for

all practical purposes the cost of the land at the three treatmen
works may be taken as the same as that for works and sludg
beds at the river, we have as annually chargeable to the rive
works the interest on their extra cost, $23,400, at 3½ per cent,
$819, and as annually chargeable to the three works the ext
cost of caring for the sludge by tank wagons over on beds. Th
extra cost, if taken at $100, would leave $719 annually to t
credit of the three separate plants. On account of this and t
probability of further treatment being a question of the remo
future, it is considered better economy to keep the pla
separate, even at the risk of their total abandonment in t
future. Further, the location of the outlets is fixed by the co
tour of the ground, and the combination of any of them can
made as well in the future as at present and without affecti
the general piping system. The above estimates are probab
low than high, since the work of uniting the outlets at the ri
involves two tunnels, a creek siphon and other difficult work, t
cost of which is more likely to run high than low.

On account of the creek siphon crossing and the possible di
culty, and hence cost, of getting a right of way through the pa
mill property on East Bridge street, a separate estimate w
made of uniting the two outlets on the north side of the cre
and carrying the sewage through the hill and under the Low
Dock road to the Hudson river and treating it there. This mea
an additional first cost over the plan proposed of $22,000. T
would only have consideration as a possible alternative, both
account of its cost and because it would make no future p
vision for the East Bridge street sewer.

In the design of the proposed treatment works we have co
sidered 600,000 gallons as the maximum flow of sanitary sewa
Also the Ripley street outlet drains about four and one-half mi
of sewers, the Upper Dock outlet, five and three-tenths, and t
East Bridge street outlet, two miles of the sewers that wo
probably be constructed. Inasmuch as the first drains most of t
manufacturing and business places, and the second would be
outlet for most of the ground water that can get into the syste
it is believed that the flow of one would about equal the oth

and the works are made practically identical. As the East Bridge outlet drains little except residences, its proportions of sewage is considered as less than would be required by its ratio of the mileage.

In view of the above the proportions of sewage to be treated have been assumed as follows:

At East Bridge street outlet, 70,000 gallons daily.
At Upper Dock outlet, 265,000 gallons daily.
At Ripley street outlet, 265,000 gallons daily.

The sizes of the tanks, including the capacity of the grit chambers, are arranged for holding about eight hours average flow at each outlet.

At the two larger works when the sewage flow, by reason of the sewers carrying surface water, exceeds the capacity of the four-inch inlet to the six-inch sewer to the grit chamber, when the flow line of the four-inch inlet is under a head of one foot, the surplus overflows the four-foot weir and is carried direct to the creek. At the point of overflowing the weir the capacity of the opening is estimated to be something over 300,000 gallons daily. On account of the estimated flow at the East Bridge street outlet being so much smaller a similar arrangement would be liable to stoppage, and hence the adoption of the leaping weir as specified.

The plans contemplated that the sludge found in the tanks will be pumped out as often as may be necessary, and at the two larger works pumping machinery is specified as part of the plans. At the East Bridge street works it is expected that the sludge being so small in quantity will be pumped out by a hand force-pump. In all cases it is expected that the sludge will be pumped into tight wagon tanks and hauled away and disposed of as farm fertilizer.

Respectfully submitted
KNIGHT & HOPKINS
Civil Engineers

SUPPLEMENTAL REPORT — SAUGERTIES SEWERS

The houses mentioned below are believed to be all within the corporate limits not benefited by having sewerage facilities:

1. Four farm and summer residences on private roads east of Mynderse street.

2. Three houses at the corporation line at the north end of the Malden road, near the Saw Kill.

3. One house at the south end of McCarthy street, the street in front of which is too low to drain to the Bridge street sewer.

4. One house on Hill street at the bridge, which is too low to be drained to the East Bridge street sewer.

5. One store on the corner of Hill and East Bridge street, also too low to drain to the East Bridge street sewer.

6. One house west of Hill street near Beach street, which is too low.

7. Three scattered small houses east of Washington street, about on the line of Montgomery street. These could be sewered if streets were opened to them and properly graded.

In addition to the above, cellar drainage is not provided for the following houses which have other sewerage facilities:

1. On Clermont street, east end, one house, cellar drainage is not needed as house can drain to the east.

2. Two houses on McCarthy street, south of Bridge. They are too low for the sewer, but if cellar drainage is needed they can drain to Esopus creek.

3. Two houses on Market street, the cellars of which are shown on the profiles, and one house on same street which has only one foot fall to the flow line of the 15-inch sewer.

4. Three houses on the north end of Ann street near the head race or canal.

5. Two low houses on Underwood street. These, if the cellars are ever wet, can drain to the ground surface to the east.

6. Two very low and poor houses on the Lower Dock road between Post street and the outlet sewer. These can readily drain to the ground surface to the rear.

TARRYTOWN, N. Y.

Plans for storm water sewers

Original plans for the sewer system of Tarrytown were approved by the State Board of Health on September 29, 1899, and appear in the 10th annual report of the Board.

The State Commissioner of Health on May 14, 1902, approved plans for storm water sewers for portions of the village, which plans appear in this report and comprise the following:

(1) A sheet containing a small-scale map of the entire village, indicating the two districts to be drained; also containing to a larger scale a map of the portions of the village drained, and the location of the proposed storm water sewers, forming Plate XLVII of this report.

(2) A sheet of profiles of the proposed storm water sewers, forming Plate XLVIII of this report.

(3) A sheet of topical sections and details of construction of the proposed storm water sewers, forming Plate XLIX of this report.

(4) A report by the designing engineer dated January 27, 1902, hereto appended.

(5) Specifications and form of proposal for the system of storm water sewers (not printed).

To the President and Board of Trustees of the Village of Tarrytown, N. Y.:

Gentlemen—As ordered by you, I have prepared plans and specifications for proposed storm sewers for the village, and I have the honor to herewith submit the same.

The plan provides for a storm sewer, having its outlet at the foot of Wildey street, and running thence along Wildey street to Orchard street; thence to Central avenue; thence to Broadway, along Broadway to McKeel avenue; thence south to Main street.

The plan also provides for a storm sewer having its outlet at the foot of White street in a brick sewer, formerly the outlet of the Andre brook. The proposed sewer runs along White street, South Orchard street, and a part of West Main street.

The proposed outlet at the foot of Wildey street is intended for a relief outlet during times of freshet. The present outlet of Andre brook being relied upon to take care of the normal flow. With the exception of the outfall, the size of which is limited by the low elevation of part of Wildey street above high water mark, all sewers are calculated to carry off an estimated maximum rainfall of two inches per hour, over a drainage area of 335 acres, and producing an estimated run-off of 240 cubic feet per second. The capacity of the outlet at the time of high water is 212 cubic feet per second, leaving 28 cubic feet per second to be carried off by the Andre brook channel. The capacity of the brook channel is nearly twice that amount, leaving an ample factor of safety. Above the junction of Andre brook the area to be drained is reduced to 175 acres, giving an estimated run-off of 131 cubic feet per second. A statement of the capacity of the different conduits is hereto attached, based on the well-known formula of Kutter and Ganguillet, as modified by Moore and Wollheim.

On part of lower Wildey street the construction of the storm sewer of large dimensions may interfere somewhat with the free use of the house sewers, this, however, can be remedied at small expense whenever it becomes necessary, by paralleling the existing house sewers. In all other streets the storm sewers are to be laid at such a depth that they will not obstruct the free access to the house sewers.

Described generally, the proposed system provides for an ellipsoid and concrete conduit seven feet eight inches by four feet, from the river to the Andre brook, and from the Andre brook to the foot of Central avenue an elliptical conduit six feet by four feet. From Orchard street to Kaldenberg place a circular brick sewer four feet in diameter. From Kaldenberg place to Broadway a 36-inch cast-iron pipe sewer. On Broadway, from Mekeel avenue to Main street, a 36-inch vitrified pipe sewer.

The system intended to relieve lower Main street and Orchard street receives the run-off of about 15 acres. The dimensions of the sewer are in excess of the requirements, but are purposely made large enough to aid inspection and cleaning. The system requires about 2500 lineal feet of vitrified pipe, ranging from 27 inches to 12 inches in diameter.

Street inlets of a simple type are to be placed at street corners and at other places where necessary.

Inasmuch as the sewers are to be used for storm water only, a more expensive type of catch-basin was not considered advisable.

The amount of work to be done, and the value, I estimate as follows:

Wildey and Central Avenue System

900 lineal feet 7′ 8″ by 4′ ellipsoid sewer concrete and brick per lineal foot, at $15	$13,500
435 lineal feet 6′ by 4′ elliptical sewer concrete and brick, at $12	5,220
1105 lineal feet 4′ circular brick sewer, at $6.50	7,182
570 feet 3′ cast-iron sewer, at $8	4,560
900 feet 30″ vitrified sewer, at $3	2,700
1350 lineal feet 12″ vitrified sewer, at 50c	675
15 manholes, at $37	555
38 street inlets, at $30	1,140
Net	$35,532
Contingencies, 10 per cent	3,553
	$39,085
Engineering, inspection, legal expenses	3,909
Gross	$42,994

Lower Main Street System

500 feet 27″ vitrified pipe sewer, at $2.50	$1,250
530 feet 24″ vitrified pipe sewer, at $2	1,060
650 feet 18″ vitrified pipe sewer, at $1.30	845
875 feet 12″ vitrified pipe sewer, at 50c	438
6 manholes, at $37	222
16 street inlets, at $30	480
Net	$4,295
Contingencies, 10 per cent	430
	$4,725
Engineering, inspection, legal expenses, 10 per cent	473
Total	$5,198

Recapitulation

Wildey and Central avenue system	$42,994
Lower Main street system	5,198
Grand total	$48,192

The amount of $48,192 may be reduced by deducting an amount of $2300 for about 350 lineal feet brick sewer in good condition, laid on Central avenue between Washington street and Kaldenberg place, giving a minimum amount of $45,892.

Very respectfully submitted

EBERHARD J. WUEFF

C. E. and Village Engineer

Tarrytown, N. Y., January 27, 1902.

TABLE OF CAPACITY OF PROPOSED CONDUITS CALCULATED ACCORDING TO KUTTER'S FORMULA

7′ 8″ *by* 4′ 0″ *Ellipsoid Conduit, Grade* 1-220

Area, 25½ square feet.
Velocity in feet per second, 8.33.
Discharge per second, 212 cubic feet.

6′ 4″ *by* 4′ *Elliptical Conduit, Grade* 1-220

Area, 18.85 square feet.
Velocity, 7.63 feet per second.
Discharge, 143.8 cubic feet per second.

4′ *Circular Brick Sewer, Grade* 1 *in* 35

Area, 12.57 square feet.
Velocity, 16.75 feet per second.
Discharge, 210 cubic feet.

36″ *Vitrified Pipe, Grade* 1-13

Area, 7.07 square feet.
Velocity, 21.45 feet per second.
Discharge, 151.65 cubic feet per second.

30″ *Vitrified Pipe, Grade* 1-35

Area, 4.91 square feet.
Velocity, 14.35 feet per second.
Discharge, 70.45 cubic feet per second.

27″ *Vitrified Pipe, Grade* 1-200

Area, 3.98 square feet.
Velocity, 5.55 feet per second.
Discharge, 22 cubic feet per second.

24″ *Vitrified Pipe Sewer, Grade* 1-200

Area, 3.14 square feet.
Velocity, 5.11 feet per second.
Discharge, 16 cubic feet per second.

18″ *Vitrified Pipe Sewer, Grade* 1-22

Area, 1.77 square feet.
Velocity, 12.31 feet per second.
Discharge, 21¾ cubic feet per second.

Capacity of Andre Brook Channel, if Cleaned

Cross-section 3 by 3.5 = area, 10.5.
Grade, one foot in 270.
Velocity, 4.54 feet per second.
Discharge, 49.7 cubic feet per second.

TONAWANDA, N. Y.

Plans for extension

Original plans for the sewer system of Tonawanda were approved by the State Board of Health on August 27, 1889, and appear in the 10th annual report of the Board. Plans for extensions of the system were approved by the State Board of Health on January 16, 1894, and appear in the 15th annual report of the Board. Plans for a change of the system were approved by the State Board of Health on September 17, 1896, and appear in the 17th annual report of the Board.

Plans for an extension of the sewer system were approved by the State Commissioner of Health on November 7, 1902, and appear in this report. These plans comprise one sheet showing a map and profile of the sewer extension and forms Plate L of this report.

WARRENSBURG, N. Y.

Original plans

Original plans for a system of sewers for the village of Warrensburg were approved by the State Commissioner of Health on June 5, 1902, subject to the construction of sewage disposal works when deemed necessary by the commissioner.

These plans comprise:

(1) A general map of the village showing the locations of sewers.

(2) Two sheets of sewer profiles.

(3) A drawing of a drop manhole.

(4) One sheet of specifications for the construction of the system for the sewers.

WARSAW, N. Y.

Original plans

Original plans for a sewer system for the village of Warsaw, including the location and general features of a sewage disposal plant, were approved by the State Commissioner of Health on January 28, 1902, subject to the preparation of suitable details and the construction of the plant when required by the State at any time after 1904.

These plans comprise:

(1) A general contoured sewer map of the village, forming Plate LI of this report.

(2) Two sheets of sewer details, forming Plate LII and LIII of this report.

(3) A roll of sewer profiles (not printed).

(4) A general plan of the treatment works, forming Plate LIV of this report.

(5) A report with an appendix of additional data by the designing engineers, hereto appended.

(6) Contract and specifications (not printed).

REPORT

The village of Warsaw, Wyoming county, lies upon both sides of Oatka creek, which flows through the village in a generally northerly direction. Mill creek, a large tributary from the southwest, joins it within the village. The village as incorporated covers about two square miles, and has an estimated present population of nearly 4000 people. The national census of 1890 gave a population of 3120.

The village has a gravity water works system, put in operation in 1895. The present consumption for all purposes is probably over one-half million gallons per day. The water from the municipal works is apparently excellent in quality and is generally used for all domestic and other purposes.

The line of the Buffalo, Rochester and Pittsburg railroad extends along near the line of the corporation on the easterly hillside. The line of the New York, Lake Erie and Western railroad cuts across the westerly side of the corporation on the westerly hillside, leaving a few houses on Buffalo and connecting streets to the west of that railroad.

The area of the watershed of Oatka creek and its tributaries south of the proposed point of disposal of the sewage is about 40 square miles. From Warsaw the creek flows in a generally northerly direction through Le Roy and thence northeasterly into the Genesee river. It is nowhere below Warsaw, so far as we know, used as a public water supply. Its average fall through the village of Warsaw is at the rate of about 30 feet per mile, and its width varies between 20 and 60 feet. Its fall, depth and general character are quite uniform. To the north of the village the grade of the creek decreases to about ten feet per mile as the valley widens and becomes more level. Between Warsaw and the Genesee river the creek receives large additions to its flow and becomes a permanent stream of considerable size. From observations of the creek, taken during the summer, fall and early winter of 1900, there would probably be no nuisance created by the village for quite a long period of years by sewering direct into the stream, inasmuch as the flow was estimated to exceed during the dry season of 1900, 700 cubic feet per minute. On account of the improbability that the creek would permanently continue to furnish enough water to dilute the future amount of sewage so that no nuisance would be created below the point of disposal, we have considered it desirable to design the system so that the entire sewage would be carried to a single point of disposal near the northerly end of the village, and at a point where purification could be easily and cheaply made in the future, and we have hence indicated on the map a location for proposed future treatment or disposal works. The northerly end of the village is at the present time a farming country, and this farming country extends for several miles along the creek to the north. No undesirable pollution from the existing system was noticed upon any of our visits to the outlets, and the complete system, if constructed at once, would probably not rapidly increase the amount of sewage, other than storm water, entering the creek, since the existing sewers carry the sewage from the business portion and a large part of the residence portion of the village.

The existing partial system which lies wholly on the east side of Oatka creek provides for carrying storm water from the streets as well as the house or sanitary sewage. It also takes in at several points some small spring brooks. On account of not increasing the amount to be carried by the existing sewers in times of rain or melting of snow, and also for the purpose of concentrating as much sewage as possible into the large main of the west side, we have considered it best to design the system so that no part of the territory lying to the west of Oatka creek shall sewer into the existing system, and hence provision is made for carrying sewage from that territory lying in the fork of Oatka and Mill creeks by the way of Brooklyn, Center and Buffalo streets, down Maple and thence across the creek by way of Court street and down Mechanic street to the outlet. While this might appear as if involving an unnecessary cut at the intersection of Buffalo and Center streets, the cut there will be only 15 feet, decreasing both ways from the intersection, and it would be nearly as great with the sewer starting on Brooklyn street only just west of Mill creek, to provide for the sewering of the low part of Brooklyn street. By carrying the sewage in this direction only one crossing of the Oatka creek is necessary as all crossings by the more expensive inverted syphons are avoided.

There are two brooks crossing Oak street and uniting into one in a ditch formed for the purpose between Maple and Liberty streets. Water from these brooks is thus conveyed at present to Buffalo street and down Buffalo street in a large open box drain laid in the southerly gutter. These brooks, while generally extremely small, at times, owing to the steepness of their watersheds, furnish quite a large amount of water which overflows the ditch between Maple and Liberty streets, causing considerable inconvenience and damage to the neighboring property. We consider it advisable to keep from the new sewers all surface water on account of the increased construction expense and increased expense of the treatment of the sewage later. Consequently we have provided for a storm sewer on Oak and Buffalo streets to care for the water for these brooks and incidentally for the surface water of Buffalo street above Wyoming and on Maple, Liberty and Center streets north of Brooklyn. This involves the construction of a 24-inch tile and 30-inch brick sewer, with catch-basins on Oak street and street inlets below. The brook to the south being the larger of the two, catch-basins are provided on both sides of Oak street to avoid the flooding of the adjacent territory in case the catch-basin on the upper or west side of the street should become clogged by debris brought down the ravine. The abandonment of the large existing open box drain on Buffalo street will greatly improve the appearance of the street and render impossible damage suits against the village by reason of injury caused by driving into the drain. A 12-inch tile surface-water sewer, with street inlet, is laid out on the map for caring for the street surface water on the north side of Buffalo street between Main and Water streets. For the rest of the village the surface drainage problem is a very simple one, as the surface water can generally be carried, as the streets are improved, along the gutters and by short lines where convenient to the streams.

The new sewer on Court and Mechanic streets is intended to cross under the 36-inch brick sewer at the intersection of Court and Mechanic streets, and the 24-inch tile sewer at the intersection of Mechanic and North streets, and for these locations special manholes are designed whereby the sewage in its ordinary flow will empty into the new 18-inch sewer and be carried down it through a 20-inch sewer to the point of disposal, but that when these existing sewers are carrying to these manholes much larger quantities by reason of storms or melting snow, the existing sewers between the manholes and the creek will act as storm overflow sewers and only a small portion of the sewage flowing in the bottom of the 36 and 24-inch sewers will be intercepted and pass down the new outlet.

To prevent the possibility of the water of Oatka creek backing up these existing sewers and into the new 18-inch line, flap or back pressure valves will be located on these existing lines. If the elevations of the invert of these existing sewers are given correctly the valves would not come into operation to prevent back flow until after the water surface of Oatka creek had risen to a point about four feet higher than was its surface in December, 1900, when the surveys for this system were made.

The inlets for the proposed new storm-water sewers are of the catch-basin type only on Oak street, where such are deemed necessary for the retention of gravel, sand and debris. These catch-basins should be cleaned after every heavy storm. The other inlets are of the direct type for the purpose of carrying the matter brought to them directly into the storm sewer. This is considered the more desirable where the systems are separated and the grades of the storm sewers are sufficient to carry the sediment. On account of the grade of the Center street sewer crossing the bore of the 30-inch brick sewer at Buffalo street, it is intended to place the manhole on the brick sewer close to the line of the Center street sewer and flatten and if necessary widen the cross section of the storm sewer at that point sufficiently to provide a proper sized section and to avoid clogging. The inside height of this part of the storm sewer will be about 15 inches.

The minimum diameter of sewer adopted for the system is eight inches, and the minimum grade for that size is three-tenths of a foot in one hundred feet, giving a carrying capacity at the rate of one-half million gallons per day.

The table below gives the minimum and maximum grades in per cent for the various sizes of pipe contemplated, and the capacities for the minimum grades. The general village map will show where these capacities occur. For intermediate grades it may be stated that doubling the grade increases the carrying capacity approximately 50 per cent.

SIZE.	Minimum grade.	Approximate capacity.	Maximum grade.
8	0.3	510,000	17.0
10	0.4	1,000,000	4.0
12	0.2	1,100,000	0.6
15	0.2	1,950,000	0.3
18	0.15	2,700,000	0.35
20	0.12	3,300,000	0.12

At the minimum grade of the storm sewer on Oak street that sewer will carry at the rate of 20,000,000 gallons of sewage per 24 hours.

A consideration of the above table, with the village map, shows to one acquainted with the probable amounts of sewage required that the sizes proposed are ample for all future needs, although the 8-inch size so largely predominates. The natural grades in the village are generally excellent, and consequently the cost of the system is materially reduced by the small sizes of the pipe needed. Another factor helping toward a low cost of the system is the fact that cellars are generally well elevated, necessitating only comparatively shallow trenches. Along the ten miles of new sewers there are nearly four miles with the depth of trench less than six feet, four miles with the depth of trench between six and eight feet deep, leaving two miles of trenching over eight feet deep, with only about one-third of a mile over twelve feet deep.

While for sizes of pipe of ten inches and larger an attempt is made to conform its capacity to the estimated requirements when the sewer is running one-third full, the 8-inch sewers are generally much larger than any theoretical estimate of the sizes required to carry the sewage would make necessary, and it is for the purpose of keeping clean the smaller sizes of pipe that the construction of 36 flush tanks is contemplated for the system. These flush tanks empty automatically and as often daily as required, and adjusted. The admission of roof water into the sewers is not contemplated, but might be allowed in a few places for flushing the upper ends of the system until such time as the use of those sewers would render unnecessary the admission of the roof water. Any permit to connect a roof with the system should contain a clause giving the village the right at any future time to require the connection to be severed. The admission of roof water might be especially advisable for a time at the few ends of the system where the depth of the trench was not sufficient for the insertion of flush tanks. At such places lampholes are provided. There are designed for the system 28 lampholes, into each of which a hose can be inserted for flushing when necessary. These lampholes are used in the place of manholes for inspection purposes, to save expense. They are placed only at the extremities of some of the lines, or between two manholes. The flush tanks are also designed with an overflow which answers the purpose of a lamphole. Through the manholes there is thus obtained at any time perfect inspection of the entire bore of the sewers, since either a manhole or a lamphole is placed at every change of grade or alignment.

For the minimum rates of grade as designed, the velocity of the sewage when the sewers are running one-third full will be over two feet per second.

All sewers, except the 30-inch storm sewer, is intended to be of vitrified tile pipe.

The system as designed contemplates sewers on all the streets of the village. Short street and those portions of Prospect and Park streets which show no sewers are resident streets, and are already provided with sewerage facilities by private drains connecting with the existing system. The north ends of Maple street beyond the upper lamphole of Main street beyond the flush tank, and Wyoming street, are in a farming territory with few houses, and if sewer facilities are ever needed on them they can be connected with the proposed system by routes which would depend upon the manner in which the territory shall become laid out. Buffalo street, between Wyoming street and Summit avenue, is a narrow and deep ravine without the least probability of a sewer ever being needed on it.

The sizes of the connecting pipe from the new catch-basin to the storm sewer are 24-inch tile lines for two catch-basins at the south end of Oak street, 18-inch tile lines at Summit avenue and 12-inch tile lines for the street inlets.

The time will undoubtedly come when a system of storm water sewers will be needed for North Main street from Mill street north with the tributary territory. Just what should be done will depend upon how that portion of the village shall become subdivided and built upon. Such a system should care for the three small brooks now crossing Main street above Rochester street. The westerly ends of Purdy, Reid and Culver avenues are low and are not built upon and probably never will be built upon if the property remains in its present condition, as it is low and subject to floods. It should be raised to provide satisfactory building property.

South Main street south from the cemetery is generally a farming section, but can be sewered into the South Main street sewer by making a deep cut about 400 feet long and between 16 and 18 feet deep through the cemetery hill. If this section should ever be built up sufficiently to need sewerage facilities the expense of this cutting would be warranted, otherwise not. Those streets on the two hillsides running parallel or approximately so with the hills have some houses on the lower or down-hill side whose cellars are too low to be drained into the sewers; but it i evident from an inspection of the contour lines of the villag map that even if all those houses are troubled with wet cellar they can be satisfactorily drained to the rear to the open groun While an attempt has been made to provide cellar drainage whe ever practicable, there are certain places like these where th expense of providing it would be unwarranted, as well as unnece sary. The profiles show the elevations and locations of the dee cellars on the various streets, except in such instances as abo mentioned, and it is noticed that the system is especially adapte for cellar drainage.

The specifications provide for the use of 13,000 feet of su soil drains of sizes from two to four inches internal diamete such drains to be placed during the construction of the syste below the sewers upon such streets as it is found desirable lower the ground-water level.

TREATMENT WORKS

The system proposed to be adopted for treating the sewage that of the septic tank and single contact filters, and a gener plan is prepared to show the proposed arrangement.

From the manhole at the lower end of the 20-inch sewer the Mechanic street outlet to the creek an 18-inch sewer planned to serve as a drainage outlet to the future treatme works, and also as a main outlet sewer until such time as the works are constructed. Its upper end is about 700 feet fro the creek, thus admitting the enlargement of the treatment wor up the sewer if necessary, and at the same time not requiri the sewer to be placed under an embankment for protectio When the treatment works are constructed, there will be lai from the manhole above referred to, a high level sewer at t elevation and grade of the 20-inch sewer to the treatment work and the excavation necessary for those works will furnish a needed embankment over it and around the works. The extreme high water at the treatment works, so far as we could learn, reaches about elevation 987 of the datum of the plans. With the elevation of the flow line of the septic tank at 986.4, this tank would operate at all times unless the maximum flood reached a higher elevation than 986, when it would be necessary to pass the sewage direct to the creek. As the flood receded the septic tank would come into action again, and a still further recession of the flood to an assumed ordinary high-water elevation of 983 or less would admit the successful operation of the contact beds, the bottom of which is at elevation 983, and the flow line 985.8. Extreme low water in the creek is probably between 979 and 980, since in December, 1900, the elevation at the outlet was 980.1. The grade line of the sewer to the septic tank and the flow line of the tank are at the same elevation.

The sewage coming to the works will first pass into a grit chamber, where the very heavy material such as sand will be largely deposited. In the grit chamber will be screens for retaining floating matter that may be carried down the piping system. The sewage will overflow from the grit chamber to the septic tank, which has a capacity of 166,500 gallons, which is assumed as one-third of the maximum daily flow of sewage that will come to the works when the present population is completely sewered. The sewage from the septic tank will be drawn off from below the flow line at the end opposite the grit chamber and carried to the regulation chamber, and thence to the contact beds. The apparatus for governing the flow onto and the discharge from the beds will be located in the regulation chamber, will be automatic in its action and so arranged that when one bed is filling with the septic sewage, a second will be standing full, a third emptying, and a fourth standing empty—the contact beds being four in number, each 40 x 140 feet. The beds will be filled to a depth of 2.8 feet with crushed stone screened to 1½ inches and larger size. Each bed will be provided with half tile surface carriers for distributing the septic sewage and round tile underdrains for draining the beds at each complete operation. These underdrains will lead to the regulation chamber and thence by a main drain to the 18-inch outlet sewer to the creek. The grit chamber will be in two compartments, and each will be connected by piping with valves attached to the sludge well situated in the engine-room. The low points of the septic tank will also be similarly connected with the sludge well. The engine-room will be provided with a pump for pumping the septic sewage direct into the outlet sewer at such times as high water in the creek would prevent the operation of the contact beds, but would not prevent the operation of the septic tank. Its suction would be in the sludge well, the sewage being piped to the latter from below the surface of the septic sewage in the tank. The engine-room would also be provided with machinery for compressing the sludge when necessary to clean the septic tank, and an engine to operate the pump. On account of the short and infrequent periods when it would be necessary to operate the pump and press, gas, gasoline or petroleum, as may prove most convenient and economical, is contemplated for fuel. Whenever it may be necessary to clean the septic tank the sewage will be passed by the tank to the low level outlet sewer and thence to the creek.

It is contemplated to roof the septic tank and grit chamber and to construct suitable buildings over the engine-room and regulation chamber.

The above method of treatment would probably be subject to material modification when the village is called upon to treat its sewage, and is given here for the purpose of outlining in a general way a plant that can be constructed and satisfactorily operated at the site selected, and which, in our opinion, will give an effluent at all times satisfactory in quality and at a low cost for maintenance—the attendance being extremely slight, except at such times as it may become necessary to pump the septic sewage or to clean the septic tank.

Respectfully submitted

KNIGHT & HOPKINS

Engineers

WARSAW SEWERS — ADDITIONAL DATA

The houses mentioned below are believed to be all that are not benefited by sewerage facilities:

1. On Wyoming street, three farm houses at distances from Buffalo street of 2733, 2825 and 2961 feet.

2. On North Maple street, one farm house 2600 feet from Buffalo street.

3. On North Main street, three farm houses at distances from North street of 3450, 4150 and 4700 feet.

The territories covered by the above farm houses would require an unwarranted expenditure to provide sewerage facilities until such time as those sections become more fully built upon, the prospects for which are very remote. The method to be adopted would then depend largely upon how those sections are built upon and intersected by other streets.

4. In addition to the above there are about four houses on the private property of the Hawley salt works, which are off Buffalo street and south of where Brad street intersects. These are cut off by the ravine between them and Buffalo street. They can construct their own sewer down the ravine or brook shown on the map to near where this brook crosses Summit street and there enter the Summit street sewer.

5. There are also two houses off Hovey hill, situated similar to those in paragraph 4, and which can sewer down the brook shown on the map and into either the Main street sewer or the lower part of the Hovey hill sewer.

The houses mentioned in paragraphs 4 and 5 do not properly come under the list of those not benefited by sewerage facilities, their disadvantageous location on their own private properties rendering only the construction of what is properly their house drains, rather more expensive than ordinarily happens.

The sewers do not provide cellar drainage for the following houses:

1. On Maple street, two houses north of Court street.

2. On View, Clinton and (the west end of) Murray streets.

3. On South Main street, one house just north of Oatka creek.

4. On Railroad street two houses, Park street north of State two houses, Livingston street one house, all on west side of streets.

5. On Brad street, three houses on east side of street.

6. On North Main street a few houses on west side between Rochester street and Culver avenue.

On account of the undesirability of lowering sewers sufficiently to care for the cellar drainage of the houses referred to in paragraphs 1 and 2, sub-soil drains are contemplated here.

All of the houses mentioned in paragraphs 4 and 5 can and generally do drain their cellars to the open ground to the rear of the houses. Those mentioned in paragraph 6 can also drain to the open ground to the rear.

The house referred to in paragraph 3 abuts on the sewer which is to empty into the existing sewer, the elevation of the proposed sewer being governed by that of the latter.

KNIGHT & HOPKINS

WEST CARTHAGE, N. Y.

Original plans

Original plans for a sewer system were approved by the State Commissioner of Health on June 27, 1902, subject to the provision that the village authorities of West Carthage would construct sewage disposal works when deemed necessary by the State Commissioner of Health.

These plans comprise:

(1) A general contoured sewer map of the village, forming Plate LV of this report.

(2) Four sheets of sewer details, forming Plates LVI, LVII, LVIII and LVIX of this report.

(3) Six sheets of sewer profiles (not printed).

(4) A report by the designing engineers, hereto appended.

(5) Contract and specifications for the construction of the system (not printed).

WEST CARTHAGE SEWER SYSTEM

The sewerage system designed for West Carthage is what is known as the separate system. The topography of West Carthage is so rolling that it was not thought advisable to construct combined systems. By using the system only for a sanitary sewer the sizes and consequent cost is smaller.

A double line can be laid more economically where it is necessary to get rid of the surface water. Surface water can be run in any of the small streams convenient, while the sanitary sewer has only one outlet into the river which is below all streets and near northwest corporation line.

It was thought advisable to carry the outlet below all mills, so as to be sure of a good flow of water in the river at the outlet constantly. *Secondly* the outlet is at a good location for disposal works if the State Board of Health should ever require it. The system is designed on a basis of 20 people to the hundred feet and a flow of 60 gallons per day per person; one-half of the daily flow to run off in eight hours, the sewer to run full. The system has a capacity at this rate for 11,000 inhabitants. The average daily flow of Black river during month of August, 1901, was over 2000 second-feet as the minimum. For 11,000 people at 60 gallons per day the daily flow equals 88,000 cubic feet, 88,000 ÷ 86,400 = 1.1 cubic feet per second, with 1.1 second-feet of sewerage flowing into a stream with a minimum flow of 20,000 second-feet it is hoped that treatment will not be required for some time.

In only a few cases are the grades flat enough to cause a velocity of less than three feet per second. In these cases the grades are not flatter than sewers heretofore constructed in the state which are giving no trouble.

Main street east of the small creek is very low and flat grade was used. It will be some time before sewers will be required there.

Considerable 6-inch pipe has been used, but the grades are so steep that it is sufficient to carry the flow.

On the outlet there is a stretch of 18-inch pipe between two shelves of 15-inch, this is on account of the grades; the 15-inch at its grade will carry the amount of the 18-inch at its grade.

Six-inch Pipe

38,026 feet of 6-inch, at 28c. per foot, cost..........	$10,878 1
1400 feet 6-inch Y, at 50c. per foot, cost...........	700 0
600 manholes less than 12-foot, at $2..............	1,200 0
8 manholes above 12-foot, at $2.50................	20 0
42,500 pounds castings, at 3c. per pound...........	1,375 0
85 buckets, at $2 each...........................	170 0
19 flush tanks, at $65............................	1,235 0
7 double flush tanks, at $90......................	630 0
85 feet lampholes, at 50c. per foot................	42 5
Creek crossings	300 0
200 drop chimneys, at 50c........................	100 0
5000 feet Est. 6-inch drain, at 15c.................	750 0
20 silt basins, at $2.............................	40 0
300 feet Y stand pipes, at 25c.....................	75 0
50 yards concrete, at $6 yard.....................	300 0
Total	$17,815 6

Eight-inch Pipe

8470 feet of 8-inch pipe, at 37c. per foot, cost.......	$3,146 9
360 8-inch Y's, at 60c............................	216 0
226 manholes less than 12-foot, at $2..............	452 0
14 manholes more than 12-foot, at $2.50............	21 0
12,500 pounds castings, at 3c. each................	375 0
25 manhole buckets, at $2........................	50 0
17 lampholes, at 50c.............................	8 5
Creek crossings	100 0
100 drop chimneys, at 50c. each..................	50 0
1500 Est. 6-inch drain, at 15c. each................	225 0
5 silt basins, at $2 each.........................	10 0

250 Y stand pipes, at 25c. each	$62 50
20 yards concrete, at $6 per yard	120 00
Total	$4,836 99

Twelve-inch Pipe

2827 feet of 12-inch pipe, at 56c. per foot, cost	$1,588 79
100 Y's, at $1	100 00
73 manholes less than 12-foot, at $2	146 00
2 manholes more than 12-foot, at $2.50	5 00
4000 pounds castings, at 3c	120 00
8 manhole buckets, at $2	16 00
2 lampholes, at 50c	1 00
Creek crossings	150 00
12 drop chimneys, at 50c	6 00
500 feet 6-inch drain, at 15c	75 00
2 silt basins, at $2	4 00
50 Y stand pipes, at 25c	12 50
10 yards concrete	60 00
Total	$2,284 29

Fifteen-inch Outlet

4891 feet, at $1, cost	$4,891 00
80 yards, at $1.35	108 00
144 manholes less than 12-foot, at $2	288 00
17 manholes more than 12-foot, at $2.50	42 50
9500 pounds castings, at 3c. per pound	285 00
19 manhole buckets, at $2	38 00
17 lampholes, at 50c. each	8 50
16 drop chimneys, at 50c. each	8 00
150 Y stand pipes, at 25c. each	37 50
140 cubic yards concrete, at $6	840 00
Total	$6,546 50

Eighteen-inch Pipe

964 feet of 18-inch pipe, at $1.10, cost	$1,060 40
20 Y's, at $2.90	58 00
34 manholes less than 12-foot, at $2	68 00

2000 pounds castings, at 3c	
4 buckets, at $2	
Total	$1
55,178 feet	$32
10.4 miles engineering and incidentals	2
Grand total	$34

Six-inch

Bridge street, 15-inch outlet to Lane	
Liberty street to Barr street to Jefferson	
Rulison to Liberty to Bridge	
Vincent street to Stone street to Champion	
High street to double flush tank to Champion	
Franklin street to Stone street to Main	
Stone street to Bridge street to Franklin	
Madison street to Franklin street to Bridge	
Jefferson street to Madison outlet to Liberty	
Main street to Liberty street to Champion	
Lathrop	
Champion to Jefferson street to flush tank	
Outlet to Vincent	

20,833 at 47c. = $9,791.51.

Eight-inch.

Bridge to Barr street to Lane	
Liberty to Jefferson street to Main	
Barr to Liberty street to Bridge	
Madison outlet to Jefferson street to Franklin	
Jefferson to Champion street to Madison outlet	
Main to 12-inch outlet to Liberty	
Champion to outlet to Jefferson	
Champion to outlet to Mill	

4533 at 58c. = $2,629.14.

Estimate of work recommended:

964 feet 18-inch	$1,254 40
4.891 feet 15-inch	6,546 50
2.827 feet 12-inch	2,284 29
4.533 feet 8-inch	2,629 14
20.833 feet 6-inch	9,791 51
34.048 feet	$22,505 84
Engineering and incidentals	1,380 00
	$23,885 84

RULES AND REGULATIONS

FOR THE

SANITARY PROTECTION OF WATER SUPPLIES

CORNELL UNIVERSITY

Rules and regulations for the protection from contamination of the water supply of Cornell university, Ithaca, N. Y.

The following rules and regulations apply to the Fall creek and all its tributaries above the Cornell university dam in the Fall creek, forming the impounding reservoir of the public water supply of Cornell university, at Ithaca, N. Y.

1. No privy or vault or place for the deposit or storage of human excreta shall be constructed, located or maintained within 50 feet, horizontal measurement, of the high-water mark of any pond or reservoir, or of the edge, margin or precipitous bank of any spring, stream, ditch, gutter or watercourse of any kind, the water of which, when running, flows eventually into a stream or reservoir forming the public water supply of Cornell university, at Ithaca, N. Y.

2. No privy vault, pit or cesspool or other nontransportable receptacle of any kind used for the deposit, reception or storage of human excreta shall be constructed, located or maintained within 300 feet, horizontal measurement, of the high-water mark of any pond or reservoir, or within 130 feet, horizontal measurement, of the edge, margin or precipitous bank of any spring, stream, ditch, gutter or watercourse of any kind, the waters of which, when running, flow eventually into a stream or reservoir forming the public water supply of said Cornell university.

3. Every privy or place of deposit, reception or storage of human excreta which is constructed, located or maintained between the aforesaid limits of 50 feet and 300 feet, horizontal measurement, of the high-water mark of any pond or reservoir, or between the aforesaid limits of 50 feet and 130 feet, horizontal measurement, of the edge, margin or precipitous bank of any spring, stream, ditch, gutter or watercourse aforesaid, and from

which privy the excreta are not at once removed automaticall by means of suitable water-tight pipes or conduits to some prope place of ultimate disposal as hereinafter provided, shall be arranged in such manner that all said excreta shall be received an temporarily maintained in suitable vessels or receptacles, whic shall be at all times maintained in an absolutely water-tight condition, and which shall admit of convenient removal to some plac of ultimate disposal as hereinafter set forth.

4. The excreta collected in the aforesaid removable receptacle shall be removed, and the receptacles cleansed and disinfected a often as may be found necessary to maintain the privy in prope sanitary condition, and to effectually and strictly prevent an overflow upon the soil or the foundation or floor of the privy. I effecting this removal the utmost care shall be exercised tha none of the contents be allowed to escape while being transporte from the privy to the place of disposal hereinafter specified, an that the least possible annoyance and inconvenience be caused t the occupants of the premises or of adjoining premises.

5. Unless otherwise specifically ordered or permitted by th State Department of Health, the excreta collected in the aforesaid receptacles, shall, when removed, be disposed of by buryin in trenches or by thoroughly digging into the soil at such place and in such manner as to effectually prevent them or any portio of them being washed over the surface of the ground by rain o melting snow, and at a distance not less than 500 feet, horizonta measurement, from the high-water mark of any pond or reservoi and not less than 300 feet, horizontal measurement, from th edge, margin, or precipitous bank of any spring, stream, ditc gutter or watercourse of any kind, the water of which, when running, flows eventually into a stream or reservoir forming th public water supply of said Cornell university.

6. Whenever it shall be found that, owing to the character o the soil or of the surface of the ground, or the character of subsoil, or height or flow of surface water or ground water, or othe special local condition, the excrement matter from a privy o aforesaid receptacle, or from any trench or place of disposal, ma in the option of the State Department of Health, be washed ove

the surface of the ground, or through the soil into any pond, reservoir, spring, stream, ditch, gutter, or other watercourse, which, when running, flows into the aforesaid public water supply of said Cornell university, then the said privy or receptacle for excreta or trench or place of disposal shall, after due notice to the owner thereof, be removed to such greater distances, or to such places as shall be considered safe by the State Department of Health.

HOUSE SLOPS, SINK WASTE, LAUNDRY WATER, REFUSE, GARBAGE, ETC.

7. No sewage, garbage, putrescible matter, house slop, sink waste, water in which milk cans, clothing or bedding have been washed or rinsed, nor any polluted water or liquid shall be thrown or discharged directly into any pond, reservoir, spring, stream, ditch, gutter, or other watercourse aforesaid, nor shall any such liquid or solid matter be thrown or discharged upon the surface of the ground or into the ground below the surface in any manner whereby the same may flow into any reservoir, pond, spring, stream, ditch, gutter, or other watercourse aforesaid, within 50 feet, horizontal measurement, of the high-water mark, edge, margin, or precipitous bank, of any pond, reservoir, spring, stream, ditch, gutter or other watercourse aforesaid.

8. No clothing, animals, vehicles, nor anything which pollutes water shall be washed in, nor shall any person bathe in any pond, reservoir, spring, stream, ditch, gutter, or other watercourse aforesaid within a distance of three miles, as the stream flows, from the dam of the reservoir forming the public water supply of said Cornell university.

MANURES, COMPOST, ETC.

9. No animal manure of any kind, nor any cleanings from stables, cattle pen, pigsty, henhouse, barnyard, hogyard, or poultry-yard shall be thrown, deposited or allowed to fall or flow into any pond, reservoir, spring, stream, ditch, gutter, or other watercourse aforesaid; and no stable, cattel pen, pigsty, henhouse,

barnyard, hogyard, poultry-yard, hitching place or standing place for horses or other animals, nor any manure pile, compost heap, piles of fermented or decayed fruit, vegetables, roots, grain, nor any piles of sawdust, leaves or other vegetable matter shall be located, maintained or allowed to remain in such place or manner that the washings of drainage therefrom may flow by open or covered drains or channels into any pond, reservoir, spring, stream, ditch, gutter, or other watercourse aforesaid, without first having passed over or through such amount of soil as to have become properly purified, and in no case shall the distance from the aforesaid stable, cattle pen, etc., to the high-water mark, edge, margin, or precipitous bank of the aforesaid pond, reservoir, spring, stream, ditch, gutter or other watercourse be less than 50 feet, horizontal measurement.

10. No human excreta nor compost containing human excreta shall be spread upon the ground within 130 feet, horizontal measurement, of the high-water mark, edge, margin or precipitous bank of any reservoir, pond, spring, stream, ditch, gutter or other watercourse aforesaid, and no manure or compost of any kind shall be spread or deposited so as to be washed a less distance than 50 feet over the surface of the ground before reaching the nearest point of the aforesaid watercourse.

DEAD ANIMALS, MANUFACTURING WASTE, ETC.

11. No dead animals, bird, or fish, nor any part thereof, nor any putrescible matter nor polluted water from any slaughterhouse, dairy, creamery, cider mill, or other manufactory shall be thrown or be allowed to run into any pond, reservoir, spring, stream, ditch, gutter, or watercourse aforesaid, nor shall any such matter be so deposited that any portion thereof, nor of the polluted drainage therefrom shall be washed therefrom over the surface of the ground or through the soil a less distance than 100 feet before reaching the nearest point of the aforesaid watercourse.

12. No screen or filter shall be used in either the impounding or in the distributing reservoirs of the public water supply of the said Cornell university, while in a foul or unclean condition, and

no screen or filter shall be used in either of the aforesaid reservoirs which is not susceptible of constant and ready examination and cleansing.

PENALTY

13. In accordance with section 70 of chapter 661 of the laws of 1893, as amended by chapter 251 of the laws of 1899, a penalty of $200 is hereby imposed against any person, firm or corporation who shall be adjudged guilty of a violation of, or a non-compliance with, any of the above mandatory rules and regulations, the same to be recovered under the above said law.

NEW YORK STATE DEPARTMENT OF HEALTH

ALBANY, N. Y., *July* 10, 1902

The above rules and regulations for the sanitary protection of the water supply of Cornell university, Ithaca, N. Y., are this day made, ordained and established pursuant to chapter 661 of the laws of 1893 of the state of New York, and chapter 251 of the laws of 1899.

DANIEL LEWIS
Commissioner of health

August 6, 1902

Mr. E. L. WILLIAMS, *Treasurer Cornell University, Ithaca, N. Y.:*

Dear Sir—I send you herewith enclosed three (3) copies of the rules and regulations for the protection from contamination of the water supply of Cornell University, Ithaca, N. Y.. two copies being for printing in your local newspapers, as suggested by you. The third copy has been signed and prepared for filing with the county clerk.

At the expiration of the six weeks of publication you should attach the affidavits of the publishers or proprietors of the newspapers in which said rules have been printed, together with a printed copy of the rules as printed in each newspaper, to the prepared copy of rules I have sent you, and file all in the county clerk's office, notifying this Department of the date of such filing.

The publication and filing of these rules should be in accordance with the provisions of section 70 of chapter 661 of the laws of 1893, as amended by chapter 251 of the laws of 1899, which you will find on page 34 of a copy of the Public health law, sent to you under a separate cover.

Very respectfully

DANIEL LEWIS

Commissioner of health

VILLAGE OF PLEASANTVILLE

Rules and regulations for the sanitary protection of the reservoirs and tributaries thereto of the water supply of the village of Pleasantville, N. Y.

PRIVIES ADJACENT TO RESERVOIRS, SPRINGS OR WATERCOURSES

1. No privy or place for the deposit or storage of human excreta shall be constructed, located or maintained within 130 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse of any kind, the water of which, when running, flows eventually into a reservoir of the Pleasantville public water supply.

2. No privy vault, pit or cesspool, or non-transportable receptacle of any kind for the reception or storage of human excreta shall be constructed, located or maintained within 250 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, or within 130 feet, horizontal measurement, of the high-water mark or precipitous bank of any stream, spring, ditch or watercourse as aforesaid.

3. Every privy or place for the deposit of human excreta which is constructed, located or maintained between the aforesaid limits

of 130 to 250 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, or 130 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring, stream, ditch or watercourse as aforesaid, and from which he said excrement is not at once removed automatically, by means of suitable water-tight pipes or conduits to some proper place of disposal beyond the maximum aforesaid limit, shall be arranged in such a manner that all said excreta shall be received and temporarily retained in suitable vessels or receptacles which shall at all times be maintained in an absolutely watertight condition, and which will admit of convenient removal to some place of ultimate disposal beyond the said maximum limits.

4. The excreta collected in the aforesaid removable receptacles shall be removed, and the receptacles cleansed and deodorized as often as is necessary to keep the receptacles in proper sanitary condition, and to prevent an overflow of the excreta upon the soil or the floor of said privy.

5. The excreta so collected shall be so removed as to cause the least nuisance possible, and shall be so disposed of that they cannot be washed either over the surface or through the subsoil into any reservoir, spring, stream, ditch or watercourse of any kind as aforesaid, and shall be so placed as not to cause an offensive nuisance.

6. Whenever it shall be found that, owing to the porous character of the soil, the height and flow of surface and subsoil waters, the steepness of the slopes, or other special conditions of the locality, the excremental matter from any privy, cesspool or other receptacle for human excreta may be washed over the surface or through the subsoil into a reservoir or any spring, stream, ditch or watercourse aforesaid, without having been thereby, in the judgment of the State Department of Health, sufficiently purified, then the said privy, cesspool or other receptacle for human xcreta shall, after due notice to the owner thereof, be removed o such greater distance from said high-water marks as shall be onsidered safe and proper by the State Department of Health.

HOUSE SLOPS, SINK WASTES, LAUNDRY WATER AND OTHER SIMILAR SEWAGE

7. No sewage, house slops, sink wastes, water in which milk cans, clothes or bedding have been washed or rinsed, nor any other polluted water or liquid shall be thrown or discharged directly into a reservoir or into any spring, stream, ditch or watercourse aforesaid, nor shall any liquid or solid matter or other polluted liquid be thrown or discharged upon the surface of the ground or into the ground below the surface in any manner whereby the same may flow into any reservoir, spring, stream, ditch or watercourse within 50 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse aforesaid.

8. No clothing, animals, vehicles, nor anything which pollutes water, shall be washed, nor shall any person bathe in any reservoir, spring, stream, ditch or watercourse aforesaid.

9. No garbage or other putrescible refuse of any kind shall be thrown or discharged directly into any reservoir, spring, stream, ditch or watercourse aforesaid, nor shall any such substances be placed upon or below the surface of the ground where they may be washed into any reservoir, spring, stream, ditch or watercourse aforesaid, within 50 feet of the high-water mark or precipitous bank thereof.

MANURES, COMPOSTS AND SIMILAR MATTER

10. No stable, pigsty, henhouse, barnyard, hog or duckyard, hitching or standing place for horses or cattle, or other place where animal manure accumulates, and compost or manure heap shall be located or maintained within 100 feet of, nor shall they or any watering place for horses, cattle or other animals be so arranged that the polluted drainings therefrom shall flow into or through open or covered drains within 50 feet of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse aforesaid.

11. No human excreta or compost containing human excreta shall be spread upon the ground within 250 feet of the high-water

mark or precipitous bank of a reservoir, or within 130 feet of the high-water mark or precipitous bank of any spring, stream, ditch or watercourse aforesaid, and no manure or composts of any kind shall be deposited so as to be washed a less distance than 50 feet over the surface or through the subsoil into any reservoir, spring, stream, ditch or watercourse without having undergone proper purification.

DEAD ANIMALS, REFUSE AND MANUFACTURING WASTES

12. No dead animal, bird or fish, or any part thereof, nor any filthy or impure matter, nor any decayed fruit or vegetable substance, nor any waste products, putrescible matter or polluted waters from any slaughter-house, dairy, creamery, cider mill, saw mill or other manufactory shall be thrown or allowed to run into any reservoir, spring, stream, ditch or watercourse aforesaid, nor shall they be so deposited that any portion thereof or of the polluted drainage therefrom shall be washed on the surface for less than 50 feet through the subsoil into any reservoir, spring, stream, ditch or watercourse aforesaid, without having undergone proper purification.

13. No interment of a human body shall be made within 500 feet of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse aforesaid.

MANAGEMENT OF THE RESERVOIRS

14. The reservoirs of the Pleasantville public water supply shall not be unnecessarily drawn down during the warm months, but shall be kept as deep and as nearly at a uniform level as possible, to prevent the pollution of the water with dead organic matter.

15. No filter or screen shall be used when in a filthy condition and liable to pollute the water in the mains; and no filter or screen shall be used at the head of the main which cannot be constantly examined and cleaned.

PENALTY

In accordance with section 70, chapter 661, laws of 1893, as amended by chapter 251 of the laws of 1899, a penalty of $50 is hereby imposed upon any corporation, person or persons guilty of a violation of or non-compliance with any of the above mandatory rules and regulations, to be recovered as provided by law, from every corporation, person or persons guilty of any such violation or non-compliance.

I hereby certify that the foregoing is a true copy of an ordinance passed by the board of health at a meeting held May 16, 1902.

W. S. MOORE
Clerk of board of health

NEW YORK STATE DEPARTMENT OF HEALTH

ALBANY, N. Y., *June* 27, 1902

The above rules and regulations for the sanitary protection of the public potable water supply of the village of Pleasantville, are this day, made, ordained and established pursuant to chapter 661 of the laws of the state of New York for 1893, and chapter 251 of the laws of the state of New York for 1899.

DANIEL LEWIS
Commissioner of health

ALBANY, *August* 23, 1902

Hon. LESLIE SUTHERLAND, *County Clerk of Westchester County, White Plains, N. Y.:*

Dear Sir—Enclosed I send you a copy of the "Rules and regulations for the sanitary protection of the reservoirs and tributaries thereto of the water supply of the village of Pleasantville, N. Y., as approved by the State Department of Health, June 27, 1902", together with the affidavit of W. S. Moore, publisher of "The Journal," to the effect that said rules and regulations have been published in said newspaper once in each week for six (6) weeks successively (from July 3, 1902, to August 7, 1902), according to law.

The rules and regulations and affidavit are now sent to you for filing in your office in accordance with the provisions of section 70, article V, of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

VILLAGE OF MIDDLEVILLE

Rules and regulations for the sanitary protection of the reservoirs and tributaries thereto of the water supply of the village of Middleville, Herkimer county, N. Y.

PRIVIES ADJACENT TO RESERVOIRS, SPRINGS OR WATERCOURSES

First. No privy or place for the deposit or storage of human excreta shall be constructed, located or maintained within 50 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse of any kind, the water of which when running flows eventually into a reservoir of the Middleville public water supply.

Second. No privy, vault, pit or cesspool, or non-transportable receptacle of any kind for the reception or storage of human excreta shall be constructed, located or maintained within 250 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, or within 130 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring, stream, ditch, or watercourse as aforesaid.

Third. Every privy or place for the deposit of human excreta which is constructed, located or maintained between the aforesaid limits of 50 and 250 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, or 50 and 130 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring, stream, ditch or watercourse as aforesaid, and from which the said excrement is not at once removed automatically by means of suitable water-tight pipes or conduits to some place of disposal beyond the maximum aforesaid limits, shall be arranged in such manner that all said excreta shall be received and temporarily retained in suitable vessels or receptacles, which shall at all times be maintained in an absolutely water-tight condition, and which will admit of convenient removal to some place of ultimate disposal beyond the said maximum limits.

Fourth. The excreta collected in the aforesaid removable receptacles shall be removed and the receptacles cleansed and deodorized as often as is necessary to keep the receptacles in proper sanitary condition, and to prevent an overflow of the excreta upon the soil or floor of said privy.

Fifth. The excreta so collected shall be removed so as to cause the least nuisance possible, and shall be so disposed of that they cannot be washed either over the surface or through the subsoil into any reservoir, spring, stream, ditch or watercourse of any kind as aforesaid, and shall be so placed as not to cause an offensive nuisance.

Sixth. Whenever it shall be found that owing to the porous character of the soil, the height and flow of surface and subsoil waters, the steepness of the slopes, or other special conditions of the locality, the excremental matter from any privy, cesspool or other receptacle for human excreta may be washed over the surface or through the subsoil into a reservoir or any spring, stream, ditch, or watercourse aforesaid without having been thereby, in the judgment of the State Department of Health, sufficiently purified, then the said privy, cesspool or other receptacle for human excreta shall, after due notice to the owner thereof, be removed to such greater distance from said high-water marks as shall be considered safe and proper by the State Department of Health.

HOUSE SLOPS, SINK WASTES, LAUNDRY WATER AND OTHER SIMILAR SEWAGE

Seventh. No sewage, house slops, sink wastes, water in which milk cans, clothes, or bedding have been washed or rinsed, nor any other polluted water or liquid shall be thrown or discharged directly into a reservoir or into any spring, stream, ditch or watercourse aforesaid, nor shall any such aforesaid liquid or solid matter, or other polluted liquid be thrown or discharged upon the surface of the ground at any point within 250 feet of any such reservoir, spring, stream, ditch or watercourse aforesaid; nor shall any such polluted liquid be discharged into the ground below the surface in any manner whereby the same may flow into any reservoir, spring, stream, ditch or watercourse aforesaid without percolating through earth for a distance of at least 50 feet, horizontal measurement, or into the ground below the surface in any manner whereby the same may flow into any reservoir, spring, stream, ditch or watercourse aforesaid, within 50 feet, horizontal measurement, of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch, or watercourse aforesaid.

Eighth. No clothing, animals, vehicles, nor anything which pollutes water, shall be washed, nor shall any person bathe in any reservoir, spring, stream, ditch or watercourse aforesaid.

Ninth. No garbage or putrescible refuse of any kind shall be thrown or discharged directly into any reservoir, spring, stream, ditch or watercourse aforesaid, nor shall any such substances be thrown or discharged upon the surface of the ground at any point within 250 feet of any such reservoir, spring, stream, ditch, or watercourse aforesaid; nor shall any such polluted liquid be discharged into the ground below the surface in any manner whereby the same may flow into any reservoir, spring, stream, ditch or watercourse aforesaid without percolating through the earth for a distance of at least 50 feet, horizontal measurement, to the high-water mark or precipitous bank of any reservoir or of any spring, stream, ditch or watercourse flowing into any reservoir placed upon or below the surface of the ground where they may washed into any spring, reservoir, stream, ditch or watercour aforesaid, within 50 feet of the high-water mark or precipito bank thereof.

MANURE, COMPOSTS AND SIMILAR MATTER

Tenth. No stable, pigsty, henhouse, barnyard, hog or du yard, hitching or standing place for cattle or horses, or otl place where animal manure accumulates, and no compost manure heap shall be located or maintained within 100 feet nor shall they or any watering place for horses, cattle, or otl animals be so arranged that the polluted drainings therefr shall be thrown or discharged upon the surface of the ground any point within 250 feet of any such reservoir, spring, strea ditch, or watercourse aforesaid; nor shall any such pollu liquid be discharged into the ground below the surface in a manner whereby the same may flow into any reservoir, spri stream, ditch or watercourse aforesaid without percolati through earth for a distance of at least 50 feet, horizontal me urement, nor flow into or through open or covered drains witl 50 feet of the high-water mark or precipitous bank of any res voir, spring, stream, ditch or watercourse aforesaid.

Eleventh. No human excreta or compost containing hum excreta shall be spread upon the ground within 250 feet of high-water mark or precipitous bank of a reservoir, or within 1 feet of the high-water mark or precipitous bank of any spri stream, ditch or watercourse aforesaid, and no manures or co posts of any kind shall be deposited so that they may be wasl at less distance than 250 feet over the surface of the ground or feet through subsoil into any reservoir, spring, stream, ditch watercourse aforesaid, without having undergone purification.

DEAD ANIMALS, VEGETABLE REFUSE AND MANUFA TURING WASTES

Twelfth. No dead animal, bird or fish, or part thereof, any filthy or impure matter, nor any decayed fruit or vegeta substance, nor any waste products, putrescible matter or pollu waters from any slaughter-house, dairy, creamery, cider-mill, sawmill, or other manufactory shall be thrown or allowed to run into any reservoir, spring, stream, ditch or watercourse aforesaid, nor shall they be so deposited that any portion thereof, or of the polluted drainage therefrom, shall be washed on the surface less than 250 feet or through the subsoil less than 50 feet into any reservoir, spring, stream, ditch or watercourse aforesaid without having undergone proper purification.

Thirteenth. No interment of a human body shall be made within 500 feet of the high-water mark or precipitous bank of any reservoir, spring, stream, ditch or watercourse aforesaid.

MANAGEMENT OF THE RESERVOIRS

Fourteenth. The reservoirs of the Middleville public water supply shall not be unnecessarily drawn down during the warm months, but shall be kept as deep and as nearly a uniform level as possible, to prevent the pollution of the water with dead organic matter.

Fifteenth. No filter or screen shall be used when in a filthy condition and liable to pollute the water in the mains; and no filter or screen shall be used at the head of the main which cannot be constantly examined and cleaned.

PENALTY

In accordance with section 70 of chapter 661 of the laws of 1893, as amended by chapter 251 of the laws of 1899, a penalty of fifty dollars is hereby imposed upon any corporation, person or persons guilty of a violation of or non-compliance with any of the above-given mandatory rules, to be recovered under the said act.

ALBANY, *June* 9, 1902

HON. DUANE M. RICHARDSON, *County Clerk of Herkimer County,*
Herkimer, N. Y.:

Dear Sir—Enclosed I send you a copy of the "Rules and regulations for the sanitary protection of the reservoirs and tributaries thereto of the water supply of the village of Middleville, Herkimer county, N. Y., as approved by the State Department of Health, March 25, 1902," together with the affidavit of Linn B Tuttle, publisher and proprietor of the Newport Journal, to the effect that said rules and regulations have been published in said newspaper each and every week for six weeks (commencing on the 11th day of April, 1902, and ending on the 23d day of May 1902), according to law.

The rules and regulations and affidavit are now sent to you for filing in your office in accordance with the provisions of section 70, article V, of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

Investigations by Order of the Governor

RMERS' FERTILIZER AND CHEMICAL COMPANY, TOWN OF DE WITT.

STATE OF NEW YORK — EXECUTIVE CHAMBER

NIEL LEWIS, M. D., *Commissioner of Health:*

nplaint having been made of the existence of a public nui- and menace to the health and comfort of the citizens of the of De Witt and county of Onondaga in this state, created e Farmers' fertilizer and chemical company, a corporation g its place of business in Syracuse and its plant in the town aid, through its method of conducting its fertilizing manu- ing works, I therefore in accordance with the provisions of n 6 of article 1 of the Public health law (chapter 661 of the of 1893, as amended by chapter 29 of the laws of 1901) y direct and require you to make an examination into the d nuisance and questions affecting the security and com- f life and health in the locality aforesaid, and to report the to me with all reasonable speed.

Given under my hand and the privy seal of the state, at the capitol in the city of Albany, this ninth day of
s.] December, in the year of our Lord one thousand nine hundred and two.

B. B. ODELL, JR.

e governor:

JAS. G. GRAHAM
Secretary to the governor

EAST SYRACUSE, N. Y., *November* 12, 1902

rable BENJAMIN B. ODELL, *Governor of the State of New ork, Albany, N. Y.:*

ar Sir—Inclosed we send you a copy of a petition filed in wn clerk's office of the town of De Witt, also the resolution ed by the town board of health of this town.

This petition is only one of several petitions of the same kind which have been filed with this office; it is the last petition filed.

The Farmers' fertilizer and chemical company of this town has been the cause of great damage to property and health of persons living in the vicinity of the factory. The odor that comes from the manufacture of their product is very disagreeable, offensive, and is dangerous to personal health. It has been decided by our board of health to refer the matter to the state authorities for prosecution.

Will you kindly give this matter the attention of your office, to the end that the nuisance may be permanently removed?

Whereas, The health officer of the town of De Witt, one H. E. Richardson, and also the clerk of the town of De Witt, W. W. Bush, attended the annual conference of sanitary officers at Albany, N. Y., on October 30 and 31, 1902, and

Whereas, It is thought best, in their judgment, to refer the matter of the Farmers' fertilizer company to the state officers for prosecution;

Now, therefore, Be it resolved that the petition heretofore filed with the town clerk of the town of De Witt, on August 16, 1902, asking for the removal of the nuisance caused by the manufacture of fertilizer by the Farmers' fertilizer company within the boundary of the town of De Witt, and also the prosecution and removal of the nuisance caused by the manufacture of phosphate by said company within the boundary of the town of De Witt, be and the same hereby is referred to the Honorable Benjamin B. Odell, Governor of the state of New York, for his action in the premises.

The above resolution is hereby adopted upon motion of C. McCarthy, which motion was duly seconded, and we, the undersigned, each endorse the foregoing and vote for said resolution in accordance with the word set opposite our names.

Charles Hiscock, chairman, aye; Calvin McCarthy, aye; T. R. Baker, aye; B. B. Andrews, aye; W. W. Bush, aye.

BOARD OF HEALTH OF THE TOWN OF DE WITT

DE WITT, *August* 15, 1902

We, the undersigned residents and property owners of the town of De Witt, living near the Farmers' fertilizer and chemical company's works in said town, respectfully submit that your order of August 8, 1901, has not been enforced as against said company, and that said company still continues to manufacture fertilizer from which noxious and unhealthy gases are generated and escape to the discomfort, annoyance and health of the subscribers, and to the destruction of foliage, fruit and vegetation in our vicinity, and we respectfully request that you forthwith execute said order and close said works.

Homer Weston, W. A. Beattie, F. N. Benedict, Hannah M. Bastable, J. A. Brosseau, Mrs. J. A. Brosseau, James S. Wickham, Lonesa W. Thayer, Sanford A. Thayer, Rosa Thorndill, George Thorndill, A. V. Hudson, Alonzo A. Hudson, Charles H. Tyler, Jennie M. Tyler, B. L. Tapner, E. Delle Beattie, Mrs. Brandt, Jacob Brandt, Charlie Brandt, Preston H. Tyler, Mrs. P. H. Tyler, James Conway, Mrs. James Conway, James Ward, Mrs. A. E. Beeler, Miss Martha Beeler, J. H. Beeler, R. J. Beeler, Mrs. A. L. Wise, Alfred L. Wise, Mrs. B. L. Tapner, E. Williams, Barbara Williams, I. H. Bogart, Mrs. Bogart, A. Acker, Sarah Acker, Henry Glen, Anna E. Chee, A. B. Morss, J. B. Fowler, Eveline Fowler, May S. Turner, George Turner, Charles A. Rice, Mrs. C. A. Rice, John W. Rice, I. W. Balch, Hattie A. Balch, F. May Balch, H. K. Black, Mrs. H. K. Black, Mrs. Charles Ames, C. E. Ames, B. F. Scott, DeEtte W. Scott, J. A. Russell, C. W. Knapp, M. E. Russell, Mary Russell, Grace Knapp Wilson, George J. Knapp, J. S. Hill, Walter E. Frank, Chas. J. Walch, M. D., Mrs. John Stein, I. D. Eddy, Alex. McCall, A. W. Miller, Martha L. Brandt, John Dunn, Jr.

Owning property in the neighborhood where this nuisance exists which affects the health of the inhabitants, and if continued will make the property almost absolutely worthless, I respectfully ask the board of health of the town of De Witt to enforce at once the ordinance of August 8, 1901: H. D. Didama, M. D., Dean of the College of Medicine, Syracuse university, July 24, 1902; Edward L. Church, Josephine E. Church, E. D. Slanson, A. Greton, Wm. H. Annable, Joseph Tiesinger, Wm. Ramish, C. J. Brandt, Mrs. C. J. Brandt, W. H. Moon, Mrs. W. H. Moon, Mrs. Anna Bryant, Edward Bryant, W. H. Gifford.

TOWN OF DE WITT, N. Y., *July* 18, 1902

To the Board of Health of the Town of De Witt, N. Y.:

We, the undersigned, residents of the town of De Witt living near the works of the Farmers' fertilizer and chemical company, and being familiar with its business; understanding that a party or parties has for a long time past in many ways tried to injure and damage said company's business and to prejudice it in the estimation of the pubilc, and have repeatedly tried to induce your Board to stop said company's business and close its works,

We do hereby declare, First, That we do not know, and have never known, of any business process or operation conducted by said company at its works which has proved harmful, dangerous to the public health, objectionable to us, or injurious to trees and plants.

Second, That we do not know, and have never known, of any one living near or within a reasonable distance of said company's works who has ever been made ill by reason of said company's processes or operations, or from any odors, fumes or gases arising therefrom.

Third, We know, that during the summer of 1901, said company, merely as an experiment, used a small quantity of what is known as "sludge" or refuse acid; that it did not intend to, and has not further used said refuse acid, and we fully understand that said company's experiment was used, and has since been used, as a basis for the complaints made against said company, and the trouble caused to it, as above stated.

Fourth, We know that said company is rapidly increasing its business, is giving employment to a considerable number of citizens of this township at good wages; that said company is likely to give steady and profitable employment to a much larger number of citizens in the near future.

Therefore, we believe that said company's industry should be encouraged, and that no obstacle should be placed to the prompt continuance of its business.

And, therefore, we hereby petition your Board that you at once remove and rescind any order heretofore made by you whose effect is, or has been, to embarass or inconvenience said company in the immediate and usual prosecution of its business.

And in witness of the above we have hereunto subscribed our names:

C. B. Cady, S. C. Pottie, Peter Ekert, J. Stephen, M. LaGrange, James Rich, H. L. Wright, B. F. Tapner, Geo. Turner, Thos. P. Fealy, R. E. Delaney, Fred Wernicker, E. W. Smith, Mrs. E. W. Smith, Mrs. John Britton, S. M. Tapner, Henry Ghee, Hattie Ghee, A. C. Webber, Mrs. A. C. Webber, Geo. Hall, Geo. Scott, John Scott, Geanie P. Scott, Margaret N. Scott, Fritz Heers, J. S. Martin, E. S. Martin, C. L. Chase, L. M. Chase, E. V. Bryant, Harry E. Spahr, James Prenderville, Russell Wallace, Elnora Spahr, Jennie Gregory, Henry Henson, John C. Henson, Levi P. Gates, Mrs. L. R. Gates, O. D. Worden, Mrs. Rosy M. Henson, Mrs. Maggie Henson, Charles Powlesland, Frank M. Bennett, Martin Holland, Wm. Graham, Richard Branson, Mrs. Walter, Annie Turner, Henry Turner, Henry M. Bennett, Mary Bennett, Frank P. Budlong, John O'Brien, John J. Burns, Mrs. John J. Burns, Chas. Williamson, James L. Jones, Edwin L. Wright, Jacob Hollander, Mary Hollander, T. D. Gillis, J. H. Gillis, George Gillis, Pierce W. Ball, Magdlene Ball, Lawrence Dornberger, Robert H. Ball, Wm. Ramish, Mrs. Anna Bryant, Chas. A. Rice, John W. Rice, Mrs. Chas. Rice, Orlie Rice, August F. Keidell, Mrs. A. F. Keidell, Miss Frances M. Keidell, Mr. J. W. Balch, Mrs. J. W. Balch, Miss J. W. Balch, J. F. Balch, Mrs. Geo. Turner, E. L. C. Lurch, Mrs. Josephine E. Lurch, William Breer, D. Breer, C. W. Knapp, G. J. Knapp, Mrs. G. F. Wilson, R. B. Wilcox, F. V. Wilcox, Mrs. R. C. Wilcox, Miss I. May Wilcox, Mrs. F. V. Wilcox, Mrs. Ghee, Mrs. M. LaGrange, Mrs. Chas. Wright, John T. Schneider, Anna S. Schneider, John Sheurer, J. F. Batzer (village trustee, Eastwood), Mrs. J. F. Batzer, M. L. Conley, Mrs. J. S. Gourley, John S. Gourley, Adda Gourley (P. M., Eastwood), Minnie I. Gourley, Chas. H. Bentley (foreman, Pierce, Butler & Pierce), William George, Mrs. Chas. Bentley, E. C. Young, Mrs. E. Young, S. L. Champlin, Mrs. S. L. Champlin, Bernard Brady, Florence Brady, Peter Peterson, Will Checkfield, S. J. Hertel, Mrs. Hertel, T. Carroll, Mrs. T. Carroll, Emerson Kneeskern, Zada Kneeskern, J. Checkfield, T. Checkfield, Herne Smith, Lucy Smith, John Norris, Hanna Norris, Geo. B. Ellison, Mrs. G. B. Ellison, Charles M. Wright, Timothy Kiley, Joseph Spencer, Mrs. J. Spencer, Geo. W. Yale, Mrs. Geo. Yale, J. R. George, John McAtee, Anna McAtee, W. C. Clayson, Mrs. W. C. Clayson, Mrs. Helene G. Rose, George Williamson, Corrie B. Williamson, Mrs. R. W. Buchholz, Miss E. E. Buchholz, B. C. Jones, Mrs. B. C. Jones, W. M. Smith Mrs. W. M. Smith.

SCHENECTADY, N. Y., *December* 2, 1902

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—Agreeable to your instructions of November twenty-fifth, relative to the verification of the conditions at the plant of the Farmers' fertilizer and chemical company of the town of De Witt, Onondaga county, N. Y., which have formed basis of a complaint to the governor, signed by Homer Weston and eighty-seven other citizens and property owners residing near the plant, I beg to report that I have examined the plant and the local conditions surrounding it and have secured information from the secretary and treasurer of the company, with the following general results:

The Farmers' fertilizer and chemical company is a domestic corporation reorganized from an older company and taking out a New York charter in 1898. Its principal place of business is Syracuse, N. Y., and its officers are as follows:

President, J. B. Kline, Syracuse, N. Y.; vice-president, F. Ackerman, Fayetteville, N. Y.; secretary and treasurer, John N. Lighthall, Syracuse, N. Y.

Business office, No. 20 Gridley building, Syracuse, N. Y.

Manufactory, north bank of Erie canal, one-half mile east of Syracuse city limits, in town of De Witt.

The company manufactures a line of acid phosphate fertilizers for general agricultural purposes, and uses as stock:

Natural Florida phosphate rock, crude sulphuric (chamber) acid, sulphate of potash, ammoniate of potash, dried blood, dried tankage from slaughter houses.

The output of the manufactory is from 2000 to 2500 tons of finished fertilizer per annum.

The complaint which was sent to Governor Odell, under date of August 15, 1902 (the letter of transmittal being dated November 12, 1902), was signed almost entirely by residents of houses situated within one-half mile of the plant in question and mostly within one-fourth mile. The complainants whom I met and interviewed stated that the odors complained of had continued at more or less frequent intervals for several years past, but had become worst during the summer of 1901. On August 8, 1901, the board of health of the town of De Witt, on complaints from citizens, issued an order to the Farmers' fertilizer and chemical company directing the company to cease the manufacture of fertilizer until it should install modern apparatus which should permit the business to be conducted in a sanitary and unobjectionable manner. Thereupon the company transferred the operation of mixing its crude rock and acid, called " acidulating " the rock, to another point outside the town, and thereby diminished somewhat the creation of odors, which appear to emanate in considerable part from the operation of acidulation and curing the rock, though not wholly so, according to the best information received. The odors continued, though in less amount or rather less frequently than before the order, and finally gave rise to the petition containing the numerous signatures dated August 15, 1902. Recently the company has commenced the installing of an improved form of mixer for the acidulation process, which the secretary and treasurer claims will prevent odors from the

Of this fact I am not at all assured, and besides am not convinced that the odors all arise from the mixing operation.

In view of the facts stated, I beg to recommend that an official investigation be made under provisions of section 6 of the Health law.

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

A hearing was given in the village of East Syracuse December 30, 1902, on complaints made against the Farmers' fertilizer and chemical company, and the evidence of a number of witnesses taken. The result of the hearing was communicated to the governor January 27, 1903, and will be published in the Twenty-fourth annual report.

Special Investigations and Reports

PINE VALLEY

ELMIRA, N. Y., *July* 2, 1902

State Board of Health, Albany, N. Y.:

Gentlemen—My attention has been called to the stagnant condition of the water at Pine Valley of this county, resulting from the abandonment of the old canal. During dry and hot weather it is claimed the water becomes stagnant to such an extent as to menace the health of the people in that locality.

I am of the opinion that the matter is of sufficient importance to justify your sending an officer to make an investigation of the existing condition in that locality, and I would like very much to have you do so as soon as the weather becomes warm and dry again, so that you may learn the exact condition that exists. If you can make such inspection, I would like to be advised a day or two in advance of the coming of the person who is to make the inspection, so that I can accompany him and thereby secure a better idea of just what is required to remedy the cause for complaint that is being made.

Kindly let me hear from you and greatly oblige,

Yours very truly

CHAS. H. KNIPP

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir — Agreeable to your dispatch of the 25th inst., visited Pine Valley in Chemung county. Called upon the complainant, Thomas Ward, Jr., and examined the territory largely submerged by the overflow of water from Catherine creek. The lands so damaged are alleged to contain about 1000 acres, principally located in the town of Veteran, bounded on the west by a high mountainous ridge, on the east by rolling table land, at the base of which courses a circuitous and vermiform creek, known as

Catherine creek, extending the whole length of the valley, estimated at sixteen miles, emptying in Seneca lake at Watkins. The average width of the valley from Horseheads to Watkins estimated at one-fourth to one-half mile. The old Chemung canal, now abandoned, coursed through the valley on the west, the towpath, now utilized for a trolley roadbed. It is further alleged that when the canal was abandoned by an act of the legislature, 1878, subsequently the state made an appropriation for the purpose of cleaning out the ditch and removing stagnant water. This was done in sections and the waters diverted at various points into Catherine creek, seeding it with eel grass. About ten years since another appropriation was made by the state to remove the eel grass from the creek, and seven or eight years ago another to clean the canal ditch of the accumulated mud, grass and other material undergoing decomposition, giving rise to much illness in the vicinity and along its course. Complaint has been made to the local health authorities, and action taken to the effect that the inundated lands were a nuisance and menace to public health. My observations at this date from present existing conditions confirm the alleged statement. It is further alleged, of the twenty land holders, seven have lost their entire crops, and the greater number of the remainder very seriously damaged. The principal product celery and hay.

Respectfully submitted

WM. G. JOHNSON

Sec'y L. D. H.

ANGELICA CREEK

SCHENECTADY, N. Y., *September* 13, 1902

DR. DANIEL LEWIS, *State Commissioner of Public Health, Albany, N. Y.:*

Dear Sir — In the matter of the pollution of Angelica creek by sewage from the county house of Allegany county, situated two miles east of the village of Angelica, Allegany county, N. Y., I beg to report that, agreeable to your instructions, I made an examination of the local conditions bearing on the matter and found them to be as follows:

Angelica is an incorporated village of 1000 inhabitants, and was formerly the half-shire town of Allegany county. The county poor-house still remains in its original location, about two miles east of the village and on Angelica creek, stream draining territory lying north and east of the village and having a drainage area of about 53 square miles and an ordinary low-water discharge of about 15 cubic feet per second.

The water supply of the village is taken from springs situated about five miles northeast from the village, and the pipe line leading to the village crosses the creek several times on its way to the village and between the site of the county house and the village.

During the recent very disastrous and unprecedented flood of that region of July 6, 1902, this creek surpassed all known accounts as to former flood volumes and damage created, and carried destruction throughout entire length. Among other items of the disaster caused by this stream was the breaking of the water pipe line above mentioned at a number of places between the county house and the village of Angelica.

The broken ends were not widely displaced, but enough so that water in appreciable quantities might have passed in or out of the breaks.

As the county house discharged its sewage into this stream above the place where the breaks occurred, much apprehension was felt by the citizens of Angelica as to the possible pollution of the village water supply from this source. While it is not possible for creek water to have entered the pipe so long as the spring water was filling the pipe, it is more than probable that the several breaks interrupted the flow of spring water and permitted creek water to enter the pipe, and this is liable to occur at any time that a break of any appreciable size occurs in the pipe line where it lies under the creek bed.

The county house had at the time of my visit about 70 inmates and 15 attendants and officials, making a total population of about 85 persons. This number may at times reach a maximum of 130 or 140.

While the pipe line was promptly repaired as thoroughly as was feasible as soon as the flood in the creek receded, there is little chance that all breaks were thoroughly stopped and there is no guaranty that future breaks may not occur. With this probability of a serious pollution of the Angelica water supply in the event of breaks occurring in the water pipe line, it would appear very necessary, as a reasonable precaution, that the sewage from the county house should be disposed of by other means than by its discharge into the stream in question. There is ample room on the premises belonging to the county house to provide for such a system of disposal as would meet the requirements of the situation, and such a system would not be expensive, compared with the beneficial results secured thereby, and the cost of operation would be practically nothing, and would be limited to the cost of an occasional inspection by the engineer or foreman of the institution, and at long intervals the cost of cleaning.

I beg to recommend, therefore, that the county authorities be requested or directed to discontinue the discharge of sewage into the stream, and to provide and use a system of sewage disposal that shall meet your approval. The supervisor of the town of Angelica in which the county house is situated is Mr. D. D. Dickson, of Angelica, who is also *ex officio* the chairman of the town board of health.

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

ALBANY, *September* 27, 1902

MR. D. D. DICKSON, *Pres't Board of Health, Angelica, N. Y.:*

Dear Sir—I enclose herewith for your information a copy of the report made by Prof. Olin H. Landreth, upon his investigation of a complaint concerning the alleged pollution of Angelica creek by reason of the discharge of sewage therein from the county house of Allegany county.

Attention is called to the recommendations made by Prof. Landreth, with the request that proper action be taken in the matter of causing the abatement of the nuisance.

Very respectfully
DANIEL LEWIS
Commissioner of Health

LEBANON SPRINGS

Columbia Hall

SCHENECTADY, N. Y., *June* 21, 1902

Mr. T. S. COOLIDGE, 478 *Central Park West, New York:*

Dear Sir—Agreeable to your letter and telegram, I visited Lebanon Springs on the 14th inst. and made an examination of the local circumstances and conditions relating to the matter of sewerage for the Columbia Hall hotel.

I met there Mr. St. Lawrence, Dr. P. R. Flannigan, health officer, and Mr. C. T. Hemmingway, clerk of the board of health of the town of New Lebanon, and with these gentlemen made a tour of the hotel premises and the line of the spring brook through the village. The hotel not yet being open and having been closed since last August or September, there were no present indications of sewage in the stream, but from a careful study of the evidence, procurable both from interested and disinterested parties, there is no doubt in my mind that the discharge of sewage from the hotel into the stream causes a very decided nuisance, which is, no doubt, added to, in some slight degree, by refuse from other sources below the hotel. Although the refuse from the acetylene gas plant at the hotel has undoubtedly made the condition worse during the past two seasons and may have been the *occasion* of the instituting of formal complaints, the testimony of careful and unbiased observers indicates that the trouble from sewage antedated the introduction of the gas plant, continued during its use, and may be expected again this season if the cause is not removed. The present cesspool appears to have been planned to intercept the solid matter of the sewage discharged into it, but very evidently does not do so, and for two obvious reasons: First, the capacity and shape of the basin and style of inlet and outlet are unfavorable to the detention and liquefaction of the solid sewage, such as might otherwise be accomplished; second, the discharge into the tank of roof water from a considerable portion of the hotel roofs, with the high velocity its descent through the conductors must give it, periodically breaks up the thick, floating crust of solid matter and causes it to be carried out through the trapped outlet with the otherwise clear sewage below, and allows it to be stranded along the banks of the little stream into which the cesspool outlet now discharges.

Another cause, which, taken in conjunction with the imperfect size and form of the cesspool, results unfavorably to the thorough detention and liquefaction of the solid matters, is to be found in the large proportion of kitchen grease and laundry soap, both characteristic of hotel sewage generally, both of which tend to coat and protect from liquefaction the more putrescible solid matters, thus greatly increasing the total amount of solid matter in the tank at any time and increasing the amount discharged into the stream.

Although the changes intimated above will lead to decided improvement in the sewage discharged into the creek and are essential to any system of disposal likely to be required here, there is little reason to believe they would sufficiently purify the sewage for harmless discharge into the stream without some subsequent further treatment, which need not, however, be complicated or expensive.

The defects to be rectified and improvements to be made to secure a satisfactory disposal system for the hotel appear, therefore, to be as follows:

First, The disconnection from the present cesspool of all roof-water connections.

Second, The introduction of a grease trap on the kitchen sewer and a soap trap on the laundry sewer.

Third, The remodeling and extending of the present cesspool to a form and size needed to secure the highest attainable degree of clarification.

Fourth, The introduction of a system of subsequent purification of the tank-effluent by filtration or subsoil irrigation on land now available, and the drainage from the same into the stream.

It is possible to accomplish this on the land of the hotel company lying west of the buildings, or at probably a good deal less expense on the land of the J. D. Hull estate, occupied and managed by Mrs. M. J. McGonagle, on which land the present outlet of the sewer discharges into the stream.

The matter of these needed improvements is not a new one; official consideration by the state and local health officials nearly a year ago was met by an assurance from the secretary and treasurer of the Columbia hall company that the discharge of raw sewage into the stream would be stopped, but diligent inquiry at the hotel and in Lebanon Springs fail to reveal the least sign of any steps toward this promised result.

It is now late in the season to carry out all the needed improvements without interruption to the hotel service or inconvenience to the guests.

While sanitary and riparian requirements must be met, there is no desire, I am sure, on the part of the state commissioner of health to inconvenience the hotel company or management nor to impose requirements more severe than are essential to protect public sanitary interests.

It seems to me entirely feasible to carry out some of the improvements at once without any material inconvenience to hotel interests and to reserve others till the end of the hotel season.

The execution of these improvements would fall under one or the other of two alternate general plans, according to whether the site for the land purification be chosen on the property of the hotel company or of the Hull estate.

In outline, the consecutive steps of the improvements by the two alternate plans, respectively, would be as follows:

Plan A using the hotel company land, *at once:*

First, Disconnect all roof-water connections from cesspool.

Second, Put in a grease trap on kitchen sewer to cesspool and a soap trap on laundry sewer.

Third, Construct on Hull estate land, near the line of present sewer, a *temporary* cesspool for this season's use only, built of rough stone, without cement, and with one or two lines of porous tile pipe leading out from it into the neighboring soil for the purpose of extending the area of absorption.

Fourth, Connect the present sewer from hotel cesspool with the new cesspool and discontinue the direct discharge of sewage into stream.

Fifth, Prepare the lands on hotel property west of the buildings by cleaning, grading, etc., for the necessary purification.

At the close of the hotel season:

Sixth, Reconstruct the present hotel cesspool to a form and size necessary to secure the highest attainable degree of clarification, and with discharging connections and siphon to adapt it to the needs of the adopted system of subsequent land treatment.

Seventh, Lay and connect a new line of outlet sewer from the remodeled cesspool at hotel westerly to the prepared purification area.

Eighth, Disconnect and discontinue the present outlet sewer from the hotel cesspool to the temporary cesspool on the land of the Hull estate.

Plan B using Hull estate land, *at once:*

First, Disconnect all roof-water connections from hotel cesspool.

Second, Put in a grease trap on kitchen sewer to cesspool, and a soap trap on laundry sewer.

Third, Construct on the land of the Hull estate, on the level areas between the stream and the westerly road, a purification area for filtration or subsoil irrigation, with an influent, dosing chamber, and siphon for intermittent discharge to the purification area, and with proper effluent drains leading to the stream.

Fourth, Connect the present sewer from hotel cesspool with the new influent chamber of purification area, and discontinue the discharge of sewage directly into the stream.

At the close of the hotel season:

Fifth, Reconstruct the present hotel cesspool to a form and size necessary to secure the highest attainable degree of clarification and reconnect it with the present outlet sewer leading to the new influent chamber on the Hull estate land.

Of the two plans, the latter one (Plan B) will, undoubtedly, be considerably less expensive, apart from the right of way, and will give satisfactory sanitary results, as will also Plan A.

The choice between the two plans is largely a matter of relative total cost of each plan.

The comparative items of expense in the two are: The cost of the new sewer from the hotel to the brush land selected, with the cost of preparing the land; as compared with the cost of right of way or lease on the Hull estate and the cost of preparing the Hull land, which will be less expensive than for the hotel land.

As between these two plans, I am unable to make a definite recommendation, as I have no means of estimating the cost of the right of way or lease of the Hull estate land.

Trusting that early and effective action will be taken in the matter, I am, dear sir,

Very truly yours
OLIN H. LANDRETH
Consulting Engineer

July 2, 1902

P. R. FLANNAGAN, M. D., *Health Officer, Lebanon Springs, N. Y.:*

Dear Sir—I enclose herewith copy of a report made by Prof. Olin H. Landreth to Mr. T. S. Coolidge concerning the matter of disposing of sewage from Columbia hall hotel in a sanitary manner.

In view of the conclusions of Prof. Landreth, you are advised that this Department will look to the board of health of the town of New Lebanon to see that no nuisance is caused by the disposition made of sewage from Columbia hall hotel.

As Prof. Landreth recommends simple and inexpensive means of disposing of sewage and other waste from the hotel, Mr. Coolidge will, no doubt, avail himself of the recommendations made; should such not be the case, your board must insist upon the maintenance of sanitary conditions.

Very respectfully
DANIEL LEWIS
Commissioner of Health

SYRACUSE WATER SUPPLY

SCHENECTADY, N. Y., *August* 27, 1902

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.*:

Dear Sir—In the matter of the Syracuse water supply and the alleged necessity for its further protection by the construction of a sewer system in and for the village of Skaneateles, which you referred to me for investigation and recommendation on August 7th, I beg to report as follows:

I visited the village of Skaneateles on the 15th inst., and, in company with Mr. B. F. Petheram, president of the village, and Civil Engineer Frederick M. Thomas, I visited and inspected the lake front.

In spite of the naturally clear and pure condition of the waters of the lake, the existence of artificial pollution skirting the shore was very evident at a number of places. The villagers appear to have respected the purity of the lake so far as relates to the disposal or discharge of refuse or garbage into the waters, which appear to be quite free from this class of contamination, but the lake is less fortunate in respect to sewage and house drainage generally. Finding that a large number of premises were apparently sewered directly or indirectly into the lake, I requested President Petheram to have prepared a list of all such premises, and to have indicated for each of such source of pollution, the precise nature and extent of the matter discharged into the lake. This request was very promptly and fully complied with and a house-to-house census of all premises likely to have a lake connection was made by Civil Engineer Frederick M. Thomas. I directed also that the canvass should show in each case whether the discharge of sewage or refuse antedated January 28, 1896, the date at which the "Rules and regulations for the sanitary protection of the Syracuse water supply" were enacted by the State Board of Health, as indicated by an order issued by Commissioner of Public Works A. R. Thompson, of Syracuse, dated or operative August 13, 1902, and issued against the village officials of Skaneateles, as well as against a number of private citizens of the village.

On reaching my office I find that the date, January 28, 1896, at which the rules and regulations were said to have been enacted is not correct. The State Board of Health adopted the rules on February 28, 1896, not January 28, but they did not go into force till after their official publication for six consecutive weeks. The month intervening between January 28 and February 28 and the following six weeks are times of the year when few, if any, sewers or drains are likely to have been laid in the locality in question, and hence the results of the canvass may be assumed as approximately correct for the actual date at which the rules of the State Board of Health went into force.

I send you enclosed the full detailed report of Mr. Thomas giving for each premises examined the class of connection found, such as bath, water-closet, laundry, etc. I also give you the following abstract or summary of the canvass, distinguishing not only the kind of connection, but also distinguishing those made before January 28, 1896, from those subsequently made.

SUMMARY OF A CANVASS OF A PORTION OF THE VILLAGE SKANEATELES, N. Y.

Made to Determine the Amount of Sewage Entering Skaneate Lake

(By FREDERICK M. THOMAS)

In the following table the disposal of sewage is indicated the following symbols:

"A" Conveyed to the lake by private drain.

"B" Conveyed to lake by public street drain.

"C" Conveyed to lake by natural watercourse and str drain.

"D" Into natural watercourse, discharging just above st dam.

"E" Into cesspool, less than 150 feet from lake.

"F" Into cesspool, more than 150 feet from lake.

"a" Indicates conditions existing prior to January 28, 1

"b" Indicates conditions established since January 28, 1

SUMMARY

Kind of Fixtures	*Number of Each Kind of Fixture*						
				a			
	A	B	C	D	E	F	T
Baths	9	8	5	..	4	9	
Water-closets	13	8	2	1	4	8	
Sinks and basins	36	12	23	2	4	10	
Laundries	4	1	1	..	3	3	
Slop-hoppers	2	1	2	..	..	..	

Kind of Fixtures	*Number of Each Kind of Fixture*						
	A	B	C	D[b]	E	F	Total
Baths	..	6	2	..	1	1	10
Water-closets	2	6	4	..	1	..	13
Sinks and basins	..	5	3	1	2	..	11
Laundries	1	2	1	..	1	..	5
Slop-hoppers	..	..	..	1	..	..	1
							40

Total number of business places which drain or which *probably* drain into the lake	21
Total number of residences which drain or which *probably* drain into the lake	80
Total number of premises draining or probably draining into lake	101
Total number of fixtures which drain or which probably drain into the lake	209
Total number of fixtures which drain into mill-pond	6
Total fixtures in above table	215
Total number of fixtures installed prior to January 28, 1896	175
Total number of fixtures installed since January 28, 1896	40
	215

From the above canvass it is evident that the sewage, or at least a portion of the sewage, from 400 or 500 people resident in Skaneateles is discharged more or less directly into the waters of Skaneateles lake. The points of discharge of the above sewers lie in the arc of a circle forming the lake front of about one-half mile radius, while the water intake of the Syracuse water supply lies approximately in the opposite circumference, being, therefore, about one mile distant from the sewer outlets. While it is true that the sewers are at the foot of the lake and the water intake is farther up the lake there is no direct flow from the sewers into the outlet owing to the two parallel jetties, which extend for quite a distance up the lake and which enclose the out-flowing current to the state dam and outlet. Sewage or water on the lake shore near the sewers cannot pass into the outlet without first passing up the lake and around the end of one of the parallel jetties. This condition causes the sewage-polluted water to accumulate behind the jetties and increases the liability of its being blown by northerly winds toward the water intake. While the distance of the intake from the sewers and from the two quadrant-shaped bays of sewage-polluted water tends toward a diminution of the danger by insuring increased dilution, it is, in my opinion, by no means sufficient to insure or even suggest safety. When it is remembered that the great danger in impure drinking water arises, not from the inert or dead organic matter, except indirectly, but from the living organisms of exceedingly low forms of life and which comprise the means for the transmission of specific forms of disease, and when it is further understood that these organisms are not destroyed by immersion or dilution in pure water, nor by ordinary degrees of heat or cold, but can and do subsist for days and even months under such conditions, it will readily be appreciated that the conditions at Skaneateles lake are such as indicate not only a possible, but, indeed, a very probable pollution and even infection of the water supply of Syracuse. It does not appear probable that the infection of the water supply is very rank, or more specifically, that the number of disease-producing organisms per cubic centimeter is large. This sparsity would not mean full immunity from disease, but simply that fewer persons drinking the water would contract diseases therefrom and also probably that, for some of the diseases at least, the first cases or those contracted directly from the water would tend to be light cases. Light cases, however, may produce very severe cases in the next transmission, and a water supply should be safe for the individuals of low vitality and resistance, as well as for the more hardy and vigorous. I understand that chemical and bacteriological examinations of the water have been made at intervals in the past and rather more frequently of late. I regret that I have been unable, owing to absence from home, to learn the results of these examinations. Whatever they may have been, and whether they confirm or apparently discredit the above conclusions as to the safety of the water supply under present conditions, it should be observed that under the conditions which prevail in the lake at Skaneateles, with no agencies that operate to thoroughly mix the polluting material with the waters of the lake, an homogeneous condition of the water entering the intake main is not to be expected, and negative evidence as to the presence or frequency of pathogenic organisms, based on widely scattered examinations, is by no means conclusive as to the safety of the water, while positive results must be accepted as conclusive. If we find a particular weed in a handful of hay picked up in a meadow, we are forced to admit that the field is contaminated with that particular weed, but we must examine a great many handfuls of hay from different parts of that field without finding the weed before we are warranted in concluding that the field does not contain the weed.

The case appears to be fully provided for by the Public health law in the following sections:

"Sec. 70. The State Board of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state." * * *

"Sec. 72. When the State Board of Health shall, for the protection of a water supply from contamination, make orders or regulations the execution of which will require or make necessary the construction and maintenance of any system of sewerage, or a change thereof, in or for any village or hamlet, whether incorporated or unincorporated, or the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such system of sewerage, or change thereof, and provide such means of removal and purification of sewage and such works or means of sewage disposal as shall be approved by the State Board of Health."

Pursuant to this provision and acting on the application of the city officials of Syracuse, the State Board of Health did, on February 28, 1896, enact rules for the protection from contamination of the Syracuse water supply as taken from Skaneateles lake, and the rules were duly published and went into operation at that time and are still in force. Further, it now appears evident from the examination I have made that the discharge of sewage from individual premises and from certain premises collectively through drains does, and has for some time past, contaminated the source of supply protected by these rules, and that the greater part of this contamination was in existence at the time of the enactment of the rules in question. That the water supply is thus contaminated is also held by Commissioner of Public Works A. R. Thompson, who, on or about August 13 1902, issued, in accordance with the provisions of the Public health law relating to the enforcement of the rules and regulations of the State Board of Health, a notice and order to the village officials of Skaneateles and to several private residents of the village notifying them that they were violating the provisions of the regulations enacted by the State Board of Health, and ordering them to cease such violation, under a penalty of not less than ten nor more than two hundred dollars. I have examined the conditions rather carefully with a view to discover another alternative, but I am unable to avoid the conclusion that the execution or enforcement of the rules and regulations now in force do "require or make necessary" the construction and maintenance of a system of sewerage and sewage disposal for the village of Skaneateles, and from the terms of the law quoted the duty of providing and maintaining this system would seem to belong to the city of Syracuse, though this is clearly a legal, rather than an engineering, question. Regarding that portion of my instructions which directed me * * * "also to confer with the proper authorities of the village of Skaneateles, also of the city of Syracuse, looking to joint action, if necessary, in the matter of constructing a system of sewers in the village of Skaneateles," I beg to report that the subject was discussed with President Petheram, of Skaneateles, and while he could not speak for the entire village government, nor for the people of the village pending a vote on a definite proposition, he was personally disposed to favor cooperation between the village of Skaneateles and the city of Syracuse in meeting the expense of the system of sewerage instead of insisting that Syracuse should assume the entire expenses alone, as the Public health law would appear on its face to warrant. At Syracuse I met Dr. Frederick W. Smith, the city health officer, and Mr. John Venner, chief inspector of the water bureau, who came to the interview as the representative of Commissioner Thompson, the latter having been detained by severe illness in his family. Owing to the absence of Commissioner Thompson, and to the fact that at that time the house-to-house canvass in Skaneateles village had not been made, the matter of the details of cooperation was not considered. Both gentlemen agreed, I think, that if the purity of the city water supply was in danger, urgent and prompt measures were warranted to place its safety beyond question.

Having since received the results of the canvass in the village and having carefully considered the probable danger to the Syracuse water supply and also the benefit which a system of sewerage would be to the village of Skaneateles, apart from its relation to the purity of the waters of the lake, I am of the opinion that the Syracuse water supply from Skaneateles lake should be protected by the construction of a sewer system in and for the village of Skaneateles, and also that the same should be built by cooperation of the two municipalities concerned, if the village of Skaneateles can be induced to join in the undertaking.

As a basis of apparently equitable cooperation, I beg to suggest that the following scheme be submitted to the two municipalities for their consideration, and, if acceptable, their adoption:

(1) That the village of Skaneateles prepare at its own expense complete plans and specifications for a system of sewerage and sewage disposal for the entire village of Skaneateles, with provision for a reasonable future growth, and that in the preparation of these plans an engineering representative of the city of Syracuse be given an opportunity for criticism and suggestions.

The plans and specifications must be such as will meet the requirements and approval of the State Department of Health in accordance with existing laws on the subject.

(2) That upon receiving the necessary guaranty from the city of Syracuse the village of Skaneateles construct the entire system of sewerage and sewage disposal, except those portions or extensions required only for future growth, in accordance with the plans and specifications, and maintain in good condition and operate the same in a proper and efficient manner perpetually at its own expense; and that it shall entirely discontinue and shall order and enforce the entire discontinuance of the discharge of sewage of every kind into the lake from all public and private sewers and drains within the corporate limits. Also that when extensions or additional features are in future needed the village of Skaneateles shall construct and properly maintain them as a part of the system.

(3) That promptly on completion of the construction of the system in substantial accordance with the approved plans and specifications for both sewerage and sewage disposal, the city of Syracuse shall pay to the fiscal authorities of the village of Skaneateles a sum of money made up of the following items:

(a) The equivalent of the entire cost of construction of two lines of trunk sewer, one along each side of the lake following generally the streets which skirt the lake shore or which approach nearest thereto, down to the point on the outlet which may be selected and approved as the location of the disposal works, this equivalent to include not only the actual cost of the construction of these two particular sewers, but also their proportional cost of any general expenses, such as those for plans, legal expenses, advertising, public election, engineering supervision and other expenses properly incurred by the sewer commission or the village trustees in the provision for, and the construction of, the entire system of sewerage and sewage disposal. The portion of the general expenses assignable to these two lines of sewers shall bear the same proportion to the total general expenses which the actual cost of the labor, material and right of way of these two lines bear to the cost of the labor, material and right of way for the entire system of sewerage and sewage disposal.

(b) The equivalent of the entire cost of construction of the sewage disposal plant complete, including its proportion of the general expenses of the entire system, to be determined as for the two lines of sewers. The disposal plant here considered shall be one that shall secure the degree of purification demanded by the requirements of the State Department of Health, with the least cost per annum for interest, depreciation, repairs and operation, and shall be so built as to be capable of future extension or modification without any considerable sacrifice of present construction.

(c) The capitalized value, at three and one-half per cent, of the estimated total annual cost of maintaining and operating the sewage disposal plant. This total annual cost shall include the estimated annual repairs, depreciation and operation, but not interest, and shall be estimated by the engineering representatives of the two municipalities concerned, if they can agree, if not, the two to select a third person and the estimate shall be made by the three or a majority of them conjointly.

(4) That on the carrying out of all the above steps the city of Syracuse shall be considered to have fully complied with all the requirements of section 72 of the Public health law, so far as relates to sewerage and sewage disposal in and for the village of Skaneateles, both now and for the future, but the payments of money by the city of Syracuse to the village of Skaneateles shall not be construed to have secured to the city of Syracuse any ownership nor title to any property in connection with the sewerage or sewage disposal systems herein provided nor to have secured any rights, privileges, liability nor obligations beyond the right to require the village of Skaneateles to carry out the above provisions regarding the maintenance and operation of the systems of sewerage and sewage disposal with their extensions, and the provisions regarding the entire discontinuance of the discharge of sewage into the lake from both public and private sewers and drains in the village of Skaneateles.

Believing that the situation at Skaneateles can be adjusted amicably between the two municipalities concerned, without any stringent measures or orders from this Department, I beg to recommend that if the above meets your approval, they be adopted by you as the recommendations of the Department to the two municipalities, and that copies of the proposed scheme of cooperation be sent to the proper officials of Syracuse and of Skaneateles with your endorsement.

I am, dear sir,

Very truly yours
OLIN H. LANDRETH
Consulting Engineer, State Department of Health

CANVASS OF A PORTION OF THE VILLAGE OF SKANEATELES, N. Y., TO DETERMINE THE AMOUNT OF HOUSE SEWAGE REACHING THE LAKE.

Disposal of sewage is indicated as follows:
A—Conveyed to lake by private drain.
B—Conveyed to lake by public street drain.
C—Conveyed to lake by natural watercourse and street drain.
D—Into natural watercourse discharging just above state dam.
E—Into cesspool, less than 150 feet from lake.
F—Into cesspool, more than 150 feet from lake.

a—Indicates conditions existing prior to January 28, 1896.
b—Indicates conditions established since January 28, 1896.
?—Indicates that conditions are probably as shown, positive information being unobtainable.

STREET	Side	OWNER OR TENANT	Bath	Water-closet	Sink or basin	Laundry tubs	Remarks.
E. Genesee	N.	Mrs. H. T. Webb	Aa	Aa	Aa	Aa	
"	"	Geo. Barrow		Da	Da		Ground water to lake, but no sewage.
"	"	F. Callender			Aa		?.
"	"	Mrs. J. Kellogg			Aa	Aa	
"	"	C. G. Wacks	Bb	Bb	Bb	Bb	New house not completed; 2 baths, 4 basins, 4 water closets.
"	"	Mrs. T. Y. Avery	Ba	Ba	Db		Slop hopper; also Db.
"	"	Mrs. Bartlett	Bb	Bb	Da		
"	"	Mrs. Turner	Bb	Bb	Ba	Ba	
"	"	H. W. Hallon	Ba	Ba	Ba	Bb	
"	"	D. A. Colton	Cb	Cb	Cb	Cb	
"	"	B. W. Terwilliger	Fa	Fa	Fa		Overflow Ba.
"	"	J. Jewell	Fa	Fa	Fa		Overflow Ba.
"	"	B. Williams					? old home; vacant; probably no drainage.
"	"	J. Low			Ba		
"	"	E. N. Leslie	Fa	Fa	Fa		Overflow Ba; never cleaned out.
"	"	F. N. Westcott	Bb	Bb	Ba		House closed at present.
"	"	W. Wallace	Ba	Ba	Ba		
"	"	Mrs. Delany			Ba		Slop hopper; also Ba.
"	"	D. Waldron			Ba		?.
"	"	M. Livingston	Bb	Bb	Bb		New house unfinished.
"	"	Lucy Shallish					Old house, probably no drainage.
"	"	C. W. Hunt	Bb	Bb	Bb		
"	S.	T. W. Specht	Fa	Fa	Fa	Fa	Cleaned out every two years.
"	"	S. Thornton	Fb	Bb			C. P. leaches into ground; sink disch. on ground.
"	"	T. Edwards Est.					Old house vacant; probably no drainage.
"	"	F. Roosevelt	Fa	Fa	Fa	Fa	Overflow Aa; cleaned yearly.
"	"	Miss L. Fitch	Ea	Ea	Aa		Overflow Aa; slop hopper also Aa.
"	"	Chas. Poor	Ea	Ea	Ea	Ea	Overflow leaches into ground.
"	"	Jos. Willetts	Ea	Ea	Ea	Ea	Overflow Aa.
"	"	Miss Birdsall	Ba	Ba	Aa		
"	"	G. Barrow			Aa		Law office.
"	"	J. Shallish			Aa		Shop.
"	"	Legg. Hall		Aa			Public hall; 2 closets seldom used.
"	"	H. W. Hallon		Ab	Aa		Drug store; chemicals and wash water.
"	"	E. Escott			Aa		Meat market.
"	"	National Bank		Aa	Aa		
"	"	Livingston & Co.		Aa	Aa		Store; sink in photo. gallery; chemicals.
"	"	G. P. Lawrence			Aa		Grocery.
"	"	J. H. Duckett		Aa	Aa		Dry goods store.
"	"	Feeley & Dorhan			Aa		?Leaches into ground near lake.
"	"	F. W. Clark			Aa		Shoe store.
"	"	Shotwell & Co.			Aa		Hardware store.
"	"	Supply store			Aa		

OSWEGO ICE

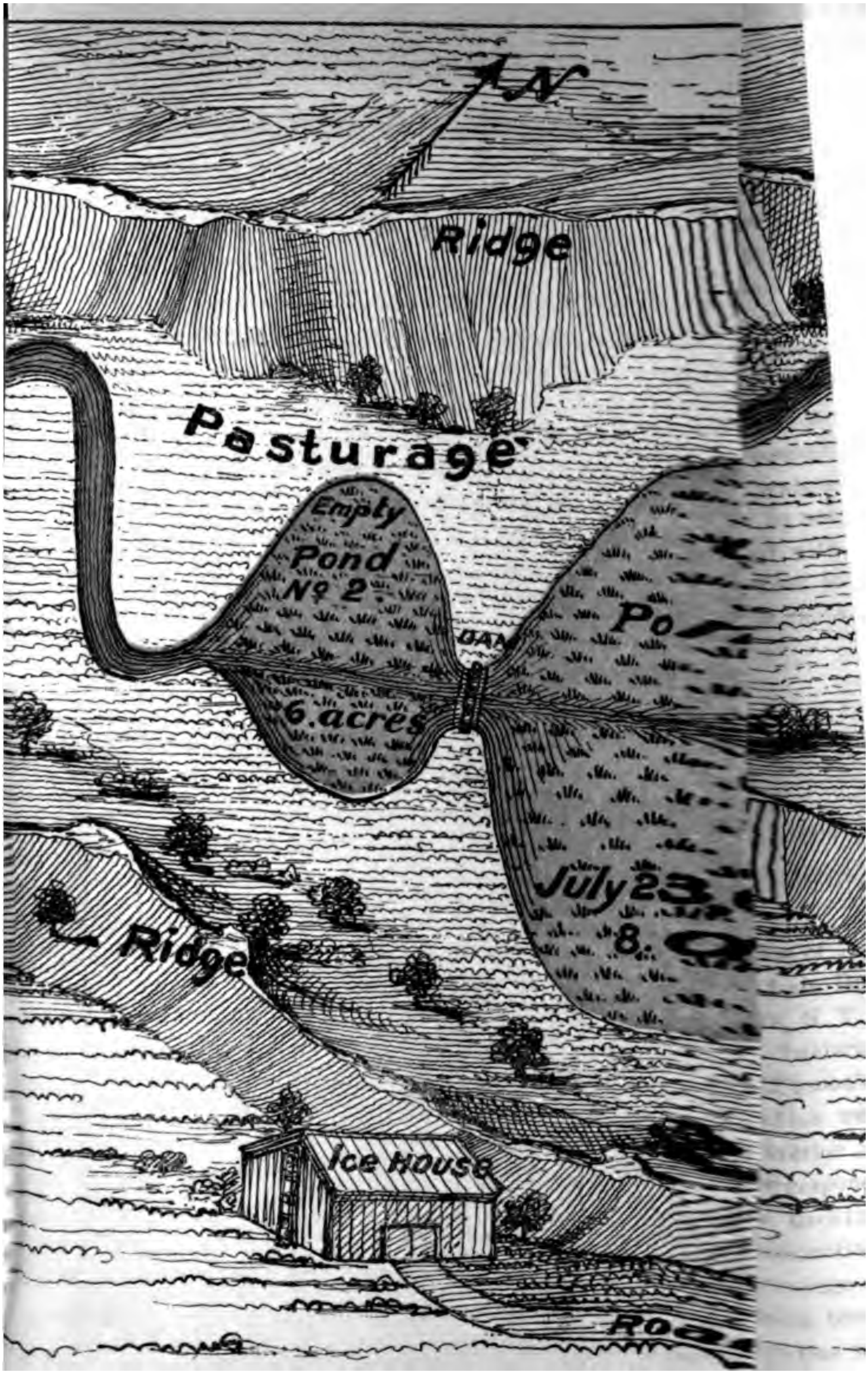
WAVERLY, N. Y., *July* 25, 1902

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—Your favor of the 17th inst. requesting an examin tion of the source of supply of the ice plant of A. W. Young, o Oswego, N. Y., upon a complaint that the ice is contaminated an unfit for domestic use, duly received.

July 22d inst. I visited Oswego and called upon A. W. Young July 23d procured two half-gallon jars, sterilized in boiling hot water one hour. Visited the ice plant in question, situate on Spring brook, two miles east of Oswego. The building i constructed of hemlock lumber, and the ice harvested within cov ered with sawdust. Sanitary condition of premises goo Obtained two samples of the ice. One clear and hard, the othe opaque or snow ice. Washed both samples as cleanly as possibl in the water of Spring brook, and under antiseptic precautio broke the ice in small pieces and filled the jars. Marked ja No. 1 "Hard ice," jar No. 2 "Snow ice," and hermetically seale them. Expressed the package containing the bottles to the ad dress of Dr. George Blumer, bacteriologist, State Departmen of Health, Albany. N. Y. Time of enclosing the ice 9.45 a. m.

The pond on which the ice is harvested is known as the "Spring brook pond," from which the ice derives its name. The pond, as a whole, consists of fourteen acres, divided by a small dam, separating it in two portions. One contains eight acres, the other six, and situated between two ridges of ground which have a maximum height in the immediate location of ponds of not more than fifteen feet. The stream or "Spring brook" has its source about one and a half miles east, alleged to be fed by small springs, and coursing serpentinely through agricultural lands, chiefly used for pasturage and emptying into Oswego river. No habitation appears to be located on the stream. The lower pond, the larger of the two, is now growing oats. It is said


N
Ridge
Pasturage
Empty
Pond
Nº 2
6.acres
DAM
Po
July 23
8.0
Ridge
Ice House
Ro

r the crops are gathered the ground remains unoccupied il the season becomes sufficiently cold to close the gates and w the pond to fill with water preparatory to making ice. e same course pursued with the upper pond until all the ice essary is procured. The chief objectional features noticed se from the droppings of ruminants and other animals pastur on the sides of the stream to which the natural drainage ws. In other respects nothing appears from the surroundings defile or pollute the water for making good and wholesome . It is further alleged that the ice formed from the waters Spring brook, secured in the ponds described, has been in use the past fifty years in the city of Oswego and favored with h repute. The stream has an average width of about four or feet and depth from eight to ten inches. At this date a rapid r of clear-looking water caused by the recent heavy rains.

Respectfully submitted

WM. E. JOHNSON

Sec'y State Department Health

July 30, 1902

niel Lewis, M. D., *Commissioner, State Department of Health, City:*

ear Sir—Following is the report of the examinations of ice eived from William E. Johnson, secretary of the State Dertment of Health, from Spring brook ice pond, Oswego, N. Y.:

Hard ice, No. 1, showed an average of 400 colonies of bacteria r cubic centimetre. Test for the colon bacillus by the Theobald mith fermentation tubes showed that the colon bacillus was esent in two out of nine tubes. There was gas production in ll of the tubes, the proportion of the gas present not correspondg in the other tubes to the gas production of the colon bacillus. This specimen of ice evidently showed sewage contamination.

Specimen No. 2 marked "Snow ice," showed an average of 5000 colonies of bacteria per cubic centimetre, and when tested by Theobald Smith's fermentation tubes the colon bacillus was

VILLAGES OF RYE AND HARRISO

RYE, N. Y., *July* 29, 19

To the Honorable Board of Health, State of New York, Alb
N. Y.:

Gentlemen:

Dear Sirs—Several complaints have been made by residen people living in the town of Rye as to a nuisance which ex on the border line between the town of Harrison and towr Rye. The town of Harrison, from investigation, sewers or dr all its surface and under drainage into the town of Rye, disch ing into a brook which is partly covered and partly open place called Meadow Street, which is no more than a swam so-called meadow. The town board of health of Rye had a c mittee appointed to meet members of the town board of healt Harrison, and the said members of the town board of health Harrison took the position that the nuisance does not come f their section, but your honorable Board will see, on the enclo map, that the same does come from the said town of Harri The town board of health of Rye would ask an early opinio your honorable Board as to what methods of procedure shoul taken to abate the said nuisance, the same being detrimenta the surrounding neighborhood, causing sickness in famil Hoping to have an early reply, I am

Very respectfully yours

D. C. LOEWENSTIN

SCHENECTADY, N. Y., *December* 9, 190

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N.*

Dear Sir — In the matter of the controversy concerning liability for the occurrence of pollution of a small stream fl ing from the village of Harrison into the town of Rye, W chester county, which I was requested to examine some ti ago, I have to report that I made the necessary examination on August 28th in the presence of the authorities of both municipalities, explaining to them the situation and the sources of the pollution, and had hoped that would suffice without action by the State Department of Health. As it appears this is not to be the case, I submit the following report on the circumstances and conditions involved in the case: Harrison is a small hamlet, unincorporated, situated on the N. Y. & N. H. R. R. in the eastern part of Westchester county and near Rye Beach on the sound. The town line between Harrison and Rye passes just in outskirts of the village. A small stream, hardly more than a drain, flows through a part of Harrison, receiving drainage and sewage from a number of sources, and enters the town of Rye at a point near the southerly line of Park avenue and just east of Harrison avenue. It flows thence along the southerly side of Park avenue for a short distance and then turns south and flows through open fields and a grove toward the sound. It is the portion of the small stream along the south line of Park avenue that is complained of by residents of Rye, and its impure condition is the ground of complaint.

The residents of the town of Rye claim that the pollution of the stream is produced during its flow through Harrison, while the residents of Harrison contend that the pollution is added after the stream enters the town of Rye. The matter is a trivial one that has stirred up sectional strife, and one that should have been settled without any question or any controversy, for the facts are evident to any unbiased observer. The small stream receives pollution from a number of sources within the town of Harrison, both from privies or closets and also from sinks and laundry drains, and when it has reached the dividing town line the water is very foul with organic matter and also discolored with humus from a muck swamp which it traverses. After entering the town of Rye the stream receives a contribution to its pollution from a milk station situated just on the town line, but mainly in the town of Rye. The point where the ditch from the milk station leaves the property of the owner is also in the town of Rye.

It results therefore that each town is at fault as to the cause of the pollution, but the town of Harrison much more so than the town of Rye. There is no question at all but that the contention of the town board of health of Harrison is correct as to the existence of the nuisance in question being *within* the town of Rye, but the other contention that the causes emanate wholly from within the town of Rye is certainly and unquestionably not correct.

Inasmuch as the matter came to your office originally in the form of a complaint from the town of Rye health officer against the pollution existing and originating in the town of Harrison, it would appear proper to issue an order against the town of Harrison board of health to abate the nuisance by discontinuing wholly the discharge of sewage, sink waste, laundry water, manure and all other kinds of organic refuse matter into the stream or into any drain or place where it may be discharged into or may flow into the stream or into any watercourse leading into it. Further, in view of the fact that the complaint to you was based on a complaint made to the Rye board of health concerning the pollution of the stream which I have stated to be in part due to pollution arising in the town of Rye, it would appear proper also to issue an order to the board of health of Rye to abate the pollution of the stream which arises in the town of Rye.

There is no reason why this entire abatement should not have been accomplished by the two boards without order from you had they been disposed to waive technicalities; since they have preferred not to do so, I beg to recommend that the order issued be made mandatory, and that in doing so you call the attention of the several authorities to the provisions of section 390 of the New York penal code relating to the pollution of streams, in addition to the usual powers of boards of health.

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

December 22, 1902

Mr. GEORGE T. GRAY, *President Board of Health, Town of Harrison, White Plains, N. Y.:*

Dear Sir—Complaint having been made to this Department by the board of health of the town of Rye that certain nuisance existed in that town by reason of the pollution in the town of Harrison of a small stream flowing through that town into the town of Rye, Prof. Olin H. Landreth, a consulting engineer of this Department was detailed to investigate the complaint, and a copy of his report is herewith enclosed for your information.

In view of the result of the investigation made by Prof. Landreth it becomes my duty to take action under section 25 of the Public health law which provides that whenever the State Department of Health shall by notice to the presiding officer of a local board of health, request him to convene such local board of health to take certain definite proceedings concerning which the State Department of Health shall be satisfied that the action recommended by it is necessary for the public good, and is within the jurisdiction of such board of health, such presiding officer *shall* convene such local board, *which shall* take the action recommended.

Under authority vested in me as state commissioner of health as provided by the section of law above referred to, you, as presiding officer of the board of health of the town of Harrison are hereby requested to convene such board that it may take the proper action to prohibit and prevent the discharge of all refuse matter into a small stream of water which flows through the town of Harrison, such pollution of the stream in question being a direct violation of section 390 of the penal code, which provides as follows:

"A person who throws or deposits gas-tar, or the refuse of a gas house or gas factory, or offal, refuse, *or other noxious or offensive* or poisonous substances *into any public waters,* or into any sewer or stream running or entering into such public waters, is guilty of a misdemeanor."

Very respectfully

DANIEL LEWIS

Commissioner of Health

WHITE PLAINS, N. Y., *December* 2

State Department of Health, Albany:

Dear Sir — Have received your communication in re
matters between the towns of Harrison and Rye of Wes
county, N. Y., and will convene board of health of the
Harrison at the earliest convenience to take action
matter referred to.

Yours very respectfully

GEORGE T. GRAY
Supervisor of Har

December 22

MR. EDWIN F. STUDWELL, *President Board of Health, town*
Port Chester, N. Y.:

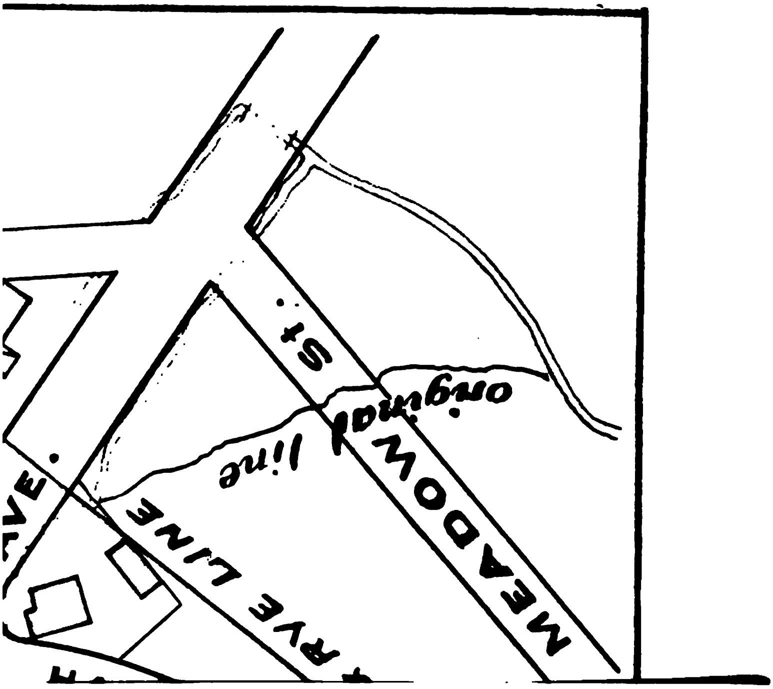
Dear Sir—Complaint having been made to this Dep
by the board of health of the town of Rye, concerning a
in that town alleged to be caused by the pollution of
stream flowing from the town of Harrison into the
Rye, Prof. Olin H. Landreth, a consulting engineer
Department, investigated the complaint, and a copy
report is herewith inclosed for your information.

I find upon the report made by Prof. Landreth that
sance complained of is contributed to by the town of
well as by the town of Harrison.

Section 25 of chapter 661 of the laws of 1893, with
ments thereto, provides as follows:

"Whenever the State Department of Health shall by
to the presiding officer of any local board of health, re
him to convene such local board to take certain definite
ceedings concerning which the State Department of H
shall be satisfied that the action recommended by it is n
sary for the public good, and is within the jurisdiction of
board of health, such presiding officer *shall* convene such
board, *which shall* take the action recommended."

Under the authority vested in me as state commission
health as provided by the above section of law, you, as



Respectfully yours

E. F. STUDWELL
Supervisor

rd of health, such presiding officer *shall* convene suc
rd, *which shall* take the action recommended."

Under the authority vested in me as state commissi
ealth as provided by the above section of law, you,

siding officer of the board of health of the town of Rye, are hereby requested to convene such board that it may take the proper action to require the abatement of a nuisance in said town caused by the discharge into a small stream, of the refuse from a milk station situated on the town line but mainly in the town of Rye.

In connection with the pollution of the stream in question, your attention is called to the provisions of section 390 of the penal code, which is as follows:

"A person who throws or deposits gas-tar, or the refuse of a gas house or gas factory, or offal, refuse, *or other noxious or offensive* or poisonous substances *into any public waters,* or into any sewer or stream running or entering into such public waters, is guilty of a misdemeanor."

The board of health of the town of Harrison has been directed to convene for the purpose of taking the necessary steps to abate the nuisances referred to by Prof. Landreth as existing in that town.

You are requested to notify me of such action as the board of health of the town of Rye may take on this matter.

Very respectfully

DANIEL LEWIS

Commissioner of Health

PORT CHESTER, N. Y., *December* 29, 1902

DANIEL LEWIS, Esq., *Commissioner, State Department of Health,*
Albany, N. Y.:

Dear Sir—Your favor of the 22d inst. at hand, in reference to nuisance at Harrison, in contention between the boards of health of Harrison and Rye, and assure you that the matter will receive our prompt attention.

Very respectfully yours

E. F. STUDWELL

Supervisor

PENN YAN

Jacobs brook

WAVERLY, N. Y., *June* 18, 1902

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the complaint of Joseph F. Mackey, C. H. Swartout and others of Penn Yan, concerning the unsanitary condition of Jacobs brook in said village, with your request of May 31st to investigate the same, I beg to submit the following report:

June 17th inst., visited Penn Yan. Called upon Health Officer H. S. Tuthill. With him, and the president of the board of health, A. C. Robinson, and Francis Reily, secretary, visited the premises on Jacobs brook mentioned in complaint.

Jacobs brook is a small streamlet emptying in the outlet of Lake Keuka on a curve coursing south through a ravine whose banks on the west are in some places fifteen feet or more in height, broadening out in the locality complained of on the east shore line, with a very shallow bank lined with large willow trees and collections of debris washed in by high water. The source of the stream from springs estimated to be about three-fourths of a mile north. Over the stream, in the business section of the village, are constructed several large buildings on firm foundation walls, and Jacobs street crosses this stream over a bridge to the main business street west. Inspection of the brook at the point alleged in complaint does not disclose obstruction to water in the stream by the foundation walls upon which the buildings are erected, and particularly at the point immediately north of the rear end of building on Jacob street. But little water now flows in the stream, not more than three or four inches in depth and three or four feet in width. The opening, ten by five, under the building covering the channel of the brook has ample dimensions for the flow of water. It is alleged the current, in time of high water, is very rapid, and, by reason of trees and debris deposited on and near the bank of low land, together with gravel washed in the channel filling up the bed, occasions for the time a miniature bay on said lands not only obstructing the ingress of water through opening under the buildings, but choking the outlet of individual sewers emptying in the brook. The examination bears evidence to this effect.

The brook is virtually an open sewer, in which it is alleged, empty directly, and indirectly, 500 closets through drains. Many are observed exposed with contents deposited upon the surface of the ground near the water line, and others remote. In some places a large amount of fecal matter has collected with other decomposed material polluting the atmosphere, unsightly in appearance, unsanitary, and a menace to public health. In a word, for nearly a quarter of a mile this condition exists, but much less in the locality at the north end of the rear of buildings on Jacob street. A sewer system is greatly needed. The municipality own their water-works. The water furnished from the lake, of good quality and in unlimited quantity.

A meeting of the board of health was called by the president and convened in the office of Dr. H. S. Tuthill. The following members of the board were present: President, A. C. Robinson; secretary, Francis Reily; member, H. Jessupp; health officer, H. S. Tuthill. The president called the meeting to order. The minutes of last meeting read and approved. In the matter of complaint, the president stated the complainant, C. H. Swartout, resided six miles away from the village, and is of no consequence in any way, shape or manner. Many of the signers are residing far from the locality, and some have moved away, while but few are affected by it.

In the complaint of Joseph F. Mackey and others, a few who have signed are not residing in the locality, and many have signed because they have been asked. The board, as a whole, regard the complaint as legitimate, and merits attention, although the cause alleged has nothing to do with existing unsanitary conditions.

The health officer reported the channel of Jacobs brook in a very unsanitary condition, a menace to public health and a public nuisance. A motion was made to accept the report of Health Officer H. S. Tuthill and so declared. Upon request of the health board, advice was given as provided for in the Public health law, article II, sections 25, 26 and 27.

Respectfully submitted
WM. E. JOHNSON
Secretary State Department of Health

June 19, 1902

Dr. WILLIAM E. JOHNSON, *Secretary State Department of Health, Waverly, N. Y.:*

Dear Sir — I am in receipt of your communication of the 18th instant, enclosing report of your investigation at Penn Yan, and note your statement that you will proceed to Waterloo to examine suspected case of smallpox.

Very respectfully
DANIEL LEWIS
Commissioner of Health
By T. A. STUART
Chief Clerk

WILMINGTON, ESSEX COUNTY

WILMINGTON, ESSEX COUNTY, N. Y., *April* 7, 1902

DANIEL LEWIS, Esq., *Commissioner of Health, Albany, N. Y.:*

Dear Sir — The J. and J. Rogers Pulp company of Ausable Forks, N. Y., own a dam on the west branch of the Ausable at this place, which acts as a catch-all for the debris and sewerage of Lake Placid hotels and sawmills. For the past two years the Rogers company have adopted a system of removing the floodgates from this dam thereby drawing the water all out and leaving the bottom of the dam reservoir exposed to the sun, which action causes a stench to arise from the sewerage deposit which is very offensive to the inhabitants of Wilmington. We have had quite a number of cases of typhoid fever here, which the doctors say are caused from using the water and inhaling the air arising from the bottom of the river when exposed to the action of the sun upon the exposed filth deposited in said dam bottom.

The west branch of the Ausable has been made a public highway for said company for the purpose of running pulp wood.

As a member of the town board of health, I would like to ask if there is any way by which the Rogers company can be compelled to keep their dam here in its normal condition or prevent them from opening the head gates to said dam and exposing the inhabitants here to liability of disease.

Numerous complaints have been made by the inhabitants and members of the board to Rogers company, but they seem to ignore our complaints. If you can suggest any way to help us out of a very disagreeable and unhealthy situation you will confer a favor upon an anxious community.

Yours truly
E. J. OLNEY

SCHENECTADY, N. Y., *July* 11, 1902

Dr. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir — I beg to report in the matter of the complaints of the unsanitary conditions existing in the village of Wilmington, Essex county, N. Y., that I visited the locality on May 30th and 31st, and found the following conditions to exist: The village is a small unincorporated hamlet, lying on the west branch of the Au Sable, fifteen miles by river below Lake Placid and nine miles above Au Sable Forks. Its permanent population probably does not exceed 250 people, but it enjoys quite an extensive patronage of summer visitors, lying as it does near some of the highest of the Adirondack peaks, including White Face and Esther mountains.

The village is divided by the river, more than two-thirds of the residences and all the business places lying on the eastern side. The principal street of the village crosses the river just above a dam, built and owned by the J. & J. Rogers Co. of Au Sable Forks, manufacturers of wood pulp and extensive owners of timber land. The dam is used to operate a saw mill and to flush the river for carrying wood down to Au Sable Forks. The flushing is done by suddenly removing the planks from a wide sluice in one end of the dam and allowing the stored water to flow out, materially raising the water in the river below, and freely floating logs at seasons when otherwise they would be stranded or considerably detained.

The sewer system of Lake Placid, a flourishing mountain resort of about 3,500 permanent population, and three times that number summer population, is said to discharge into this branch of the river about fifteen miles above the dam which is the first below Lake Placid, except a flushing dam at Wilmington Notch normally kept open. The Wilmington dam raises the water about ten feet above its ordinary line and backs up the river for about two miles up-stream. The average width of the pond thus formed is about 150 to 200 feet, three times the width of the original channel. At times the dam is closed soon after a flush of water has been sent down, but sometimes it is allowed to remain open, thus leaving about two-thirds of the bed of the pond exposed. At the time of my visit the dam was closed, but several of the residents stated that when open during warm weather the odors from the exposed bottom are extremely offensive from the exposure of the precipitated organic matter and from foul stagnant water in pools not drained by the emptying of the pond.

From the facts stated to me and authenticated by independent witnesses I have little doubt that the conditions are as bad as claimed and they can hardly fail to be unsanitary in the extreme.

Bad as these conditions are, another cause more seriously endangers the health of the residents. The village of Wilmington has no system of public water supply, and water is difficult to secure in wells or springs on the east side of the river, where a large majority of its population reside. These people largely depend for their domestic consumption on water carried from the river and from a spring near the river bank. The ice stored for the summer hotels and cottages is also cut from this mill pond.

Dr. A. J. Merrill, the present health officer of the town of Wilmington, and Dr. E. S. Howe, the former health officer, each stated independently that typhoid had been more prevalent in Wilmington since the building of the Lake Placid sewer system than ever before, and each stated that all of their cases of typhoid in the village had occurred among persons who were using river water at the time they were taken sick. One patient has just died from the disease and other deaths have occurred before this.

It is evident that two distinct evils occur in the river at this point: (1) The fouling of the bed of the river by precipitated sewage from Lake Placid and organic matter from other sources taken in conjunction with the drawing down of the water by the Rogers company produces what would seem to be a nuisance: (2) The infection of the river water by sewage known to be discharged into it at Lake Placid, in connection with the use of this water by the residents of Wilmington, causes a direct danger to life and health in the latter place of a positive and extreme character and one to suppress which radical and effective measures would seem to be fully warranted and demanded.

Concerning the first of these two evils, it was ascertained that while various informal complaints by citizens and individual members of the town board of health had been made to individuals connected with the Rogers company, no formal, official complaint or order has ever been made by the town board of health against the drawing down of the water of the pond or the fouling of the bed of the pond by organic matter and sewage; nor has either of these or the exposure of the foul bed of the pond been officially declared by the board of health to be a nuisance.

It would appear that the proper and regular procedure to secure relief from this first evil would be for the town board of health of Wilmington to officially investigate the matter, and if the board should find that the exposure of the alleged foul bed of the pond produced conditions which constitute a detriment or a menace to life or health, then the board should officially declare such conditions to be nuisances, and should serve notice of such action and an order to abate the same on the responsible persons; after determining who the responsible persons or corporations are, whether the owners of the bed of the pond; in this case the Rogers company, or the persons responsible for the fouling of the bed of the pond, in this case apparently the municipality of Lake Placid, with perhaps other parties contributing to the pollution, or several of these parties conjunctly. If any of these parties responsible for the nuisance should be found to be not subject to the jurisdiction of the Wilmington board of health it would then apparently be the duty of the local board of health to submit a full statement of the case to the State Department of Health with a request to take such steps as should bring to the local community the relief from such portions of the nuisance as their want of jurisdiction made it impossible for the local board of health to secure.

Concerning the second of the two evils, viz., the discharge of crude sewage into the river at Lake Placid and the use of the water for domestic purposes by the residents of Wilmington, there is no ground for doubt or question that the discharge of crude sewage into the river at Lake Placid and the use of the water for domestic purposes by the citizens of Wilmington are absolutely incompatible with safety to life and health of the people who use the water. There would also appear to be little doubt under the local circumstances, as to the respective rights of the two communities to the use of the river for these two adverse purposes.

It was stated both by Town Clerk O. L. Olney and former Health Officer Dr. E. S. Howe that during the construction of the Lake Placid sewers the matter was looked into by several members of the Wilmington board of health and informal protests made against the discharge of the sewage into the Au Sable river or any tributary thereof, but that no formal complaint or protest had ever been made by the Wilmington authorities.

The plans for the system of sewers at Lake Placid were approved by the State Board of Health on June 7, 1893, and are published in the annual report of the Board for 1894. The published plans contain only a map of the system and show the outlet discharging into Chubs river. The petition asking for the approval of the system recites that the district to be sewered, then unincorporated, contained "a permanent population of at least 400 people, and that during the summer months this number is greatly increased by summer visitors to the place." I do not understand that this approval would operate as a bar to prevent abatement of this source of danger. Since that time Lake Placid has become an incorporated village with a population eight or ten times as large as when the plans were approved, and sanitary knowledge of the relation of stream pollution to public health has been materially advanced; it can hardly be supposed that the Board in approving the plans could foresee the present conditions and moreover it would appear untenable to suppose that the approval of an executive body like the State Board of Health could operate to legalize conditions which in themselves are later shown to be detrimental to health.

The remedy for the evil in question would be in the nature of additions to the system rather than a sacrifice of any portion formerly approved, so that the approval and its withdrawal could not be considered as entailing any loss or injury to the village.

For these reasons and in view of the seriousness of the danger to the life and health of residents on the stream who are entitled to the normal purity of the waters, it seems to me entirely proper for you to require the authorities of the village of Lake Placid to proceed at once to install a sewage disposal plant which shall be acceptable to you.

My recommendations therefor are:

First, That the board of health of the town of Wilmington be directed to meet and investigate the conditions which are brought about when the Wilmington pond is drawn down, and if found to produce conditions which are detrimental to health, the same be officially declared a nuisance, and official orders be issued to the parties responsible for the conditions, to abate the same.

Second, That if the Wilmington board of health, from a lack of jurisdiction or from other cause, finds itself unable to enforce the necessary orders to abate the detrimental conditions, the board be directed to report the facts fully to you as state commissioner of health, and that you take the steps needed to secure the relief necessary and available.

Third, That if you are satisfied that the sewage of Lake Placid is being discharged into a tributary of the west branch of the Au Sable river, and that this constitutes a serious danger to the life and health of citizens of the state, you take such steps as may, in your opinion, be necessary to stop such discharge of sewage or to render the same harmless before discharge.

Yours very truly
OLIN H. LANDRETH
Consulting Engineer

SOUTH NYACK

Washington avenue sewer

NYACK, N. Y., *February* 26, 1902

To State Board of Health, Albany, N. Y.:

Gentlemen—I am obliged to appeal to you, asking your aid to compel the South Nyack board of trustees to lay a new sewer through Washington avenue. For the past four years, times without number, the lower part of my house has been flooded out with sewer water. At the present time my dining room, kitchen and the whole lower part of house is filled with 1 1-2 feet of sewer water. The sewer pipe is only a six-inch pipe, and that to accommodate all the houses, and particularly the Christian alliance institute, which at times has two to three hundred students, is simply appalling. I have appealed to the board time and time again without any relief. They acknowledge the sewer is too small, but do nothing to remedy it. The house opposite, owned by Mr. G. M. Hard, and my house, are the ones that are flooded every time the sewer is blocked. It is causing sickness in my family at the present time, and if necessary will send you a letter from my family physician. Praying that the Board will act for me as promptly as they did in the case of the Depew barn on Broadway, a few weeks ago, and trusting you will take immediate action in my behalf, I beg to remain

Yours very truly

Mrs. E. W. BOGARDUS
107 Washington Ave.
South Nyack, N. Y.

NYACK-ON-HUDSON, *March* 1, 1902

State Board of Health, Albany, N. Y.:

Gentlemen—Replying to yours of February 28th, relating to the complaint of Mrs. E. W. Bogardus, of 107 Washington avenue, this village, would say: The trustees of village of South Nyack admit the conditions as they exist but are powerless under the law to remedy the matter except by the regular means of submitting it to the voters of village to empower them to go to the expense in issuing bonds for the payment of such sewer—or, the consent of the property owners of Washington avenue, agreeing to be taxed for this improvement. Mrs. Bogardus has been asked to secure signatures to a petition of her neighbors and residents of Washington avenue, praying for such an improvement, whereby the matter may be laid before the taxpayers for a vote. If you have any other means of empowering the village trustees to put in such a sewer, I should be glad to hear from you.

This sewer on Washington avenue is a *private sewer* which the residents are allowed to use, as the property owners of thirty years ago built it. It was constructed by a man who jogged around a boulder instead of removing it, and has many curves and bends that continually give trouble in blockades. The large Christian alliance buildings have been allowed to connect with it in recent years and it is wholly inadequate.

I have investigated Mrs. Bogardus' premises and seen her family physician and have every reason to believe such conditions exist as she states. Her property lies below the street level and much surface water lies in her yard and some of this gives her trouble doubtless.

I should be glad to have your opinion as to what action you or I may be able to take in the premises.

Yours very respectfully

S. W. S. TOMS, M. D.

Health officer for So. Nyack

November 24, 1902

Mr. JOSEPH KELLEY, *Clerk Board of Trustees, Village of South Nyack, N. Y.:*

Dear Sir—Complaint having been received by this Department concerning the condition of a sewer in Washington avenue, South Nyack, and the same having been referred to your health officer, who has reported that a nuisance is caused thereby which is detrimental to health, and the existence of such a nuisance having been confirmed by an inspection made by the consulting engineer of this Department, as well as by myself, the trustees of the village of South Nyack are hereby directed to take steps for the immediate repair of said sewer in such a way as to abate the nuisance complained of; such repairs to be made in accordance with the plans for the sewer in that street, which have been approved by this Department.

Yours very truly

(Signed) DANIEL LEWIS

State Commissioner of Health

November 24, 1902

Mr. JOSEPH KELLEY, *Clerk Board of Trustees, South Nyack, N. Y.:*

Dear Sir—In explanation of the order hereby served on the village trustees of South Nyack, I wish to state that I have consulted with the attorney-general's office, and am informed that you can repair said sewer to any extent, even to that of putting in new pipe for the entire distance, or changing the grades, if necessary, in order to abate the nuisance in accordance with our order; and that the expense thereof can be included in the next tax levy, the same as other ordinary expenses. Prof. Landreth informs me that if you will advertise for the work of repair, he will send you a contractor who will bid about $1 per foot for the work. Trusting that your village will undertake this repair before long-suffering residents may take legal steps for the abatement of the nuisance, I remain,

Very truly yours
(Signed) DANIEL LEWIS
State Commissioner of Health

CASSADAGA LAKE

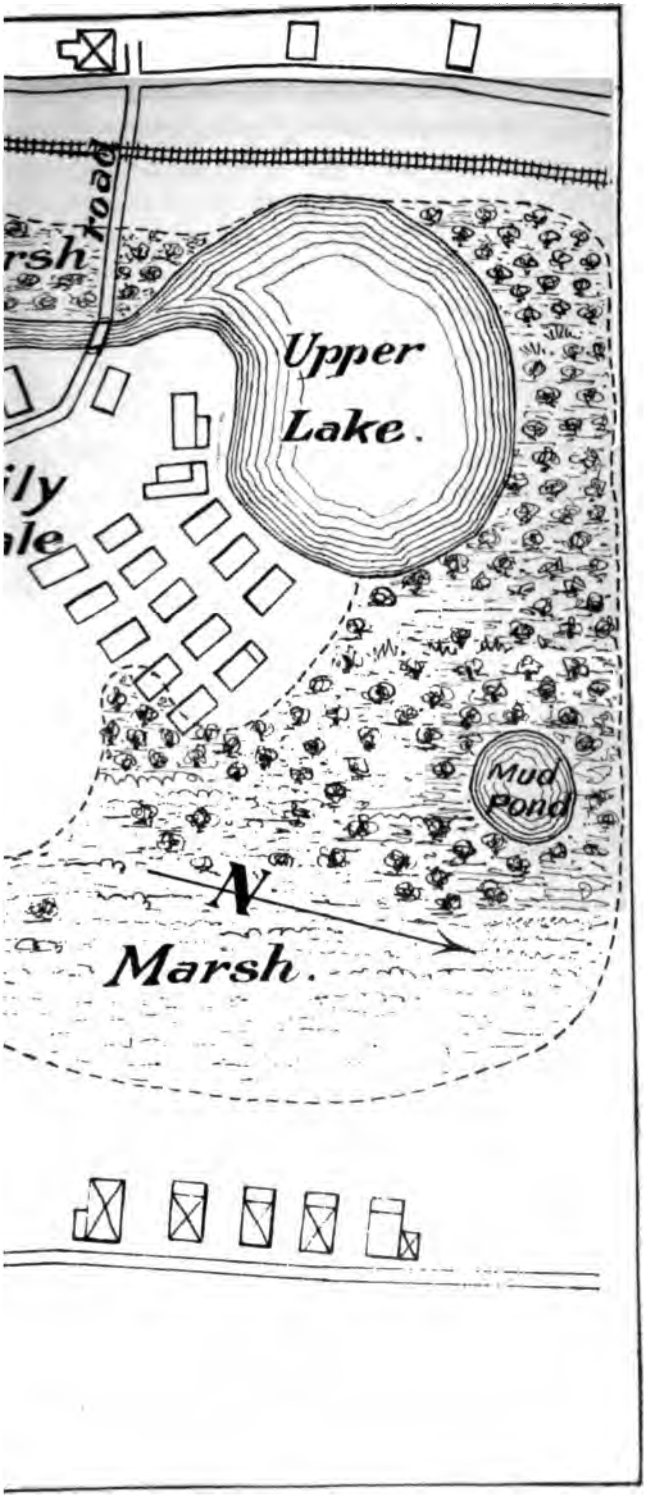
DANIEL LEWIS, M. D., *Commissioner State Department of Health, Albany, N. Y.:*

Dear Sir—Upon information received at the State Department of Health, Albany, N. Y., concerning the unsanitary condition in and about Cassadaga lake, town of Stockton, county of Chautauqua, N. Y., with directions given to investigate the same, I proceeded to Cassadaga lake, January 24th inst., and in compliance with such direction beg to submit the following report:

Cassadaga, N. Y., January 25, 1902. A small hamlet of 500 inhabitants, situated at the outlet of Cassadaga lake. The lake is about two miles in extent, consisting as a whole of three lakes joined by two channels, the upper channel two rods wide, the lower four rods. The northern extremity extending in the town of Pomfret. The middle lake, the smaller, and upon the adjoining land is situated a summer resort known as Lilly Dale, a mile and a half distant northerly from the outlet, inhabited by fifty or sixty families. There are about 200 cottages upon the grounds. When occupied during the open season the population is said to consist on an average of 2000 people. The lake is plied in the open season by two steamboats. One a regular excursion boat, the other a pleasure boat, together with other small craft, known as naphtha launches. The lake is fed by springs and small streams.

The village of Cassadaga has no sewer system or water supply except from wells. The outlet of lake extends to the Conewango creek, 20 miles south, thence to the Allegany river. The outlet embraces a large tract of low swamp and marsh land, estimated over 1000 acres, covering an area of over two square miles in the immediate vicinity of Cassadaga and Lilly Dale. At this date the ground is covered with an unusual depth of snow, obscuring much that is alleged to exist underneath in a state of decomposition.

The general contour of the locality is well defined, with many places near the outlet open to inspection. The exuberant growth of vegetable matter, fallen and decayed timber, old trees, rubbish, large shrubbery standing throughout this domain, has contributed to narrowing and closing up the channel to the extent of obstructing the flow of water, causing it to spread over the territory described, and holding in suspension the decayed material until evaporated by the sun, the exhalation of which during the hot weather impregnates the atmosphere with its toxic properties, causing a serious menace to the public health. It is alleged by the health officer, O. C. Shaw, of the town of Stockton, who resides in Cassadaga, that during the past year he has prescribed and treated over 500 cases of malarial disease. The swamps are extensive breeding nests for the mosquito, infesting the district in myriad colonies, to vex, disturb, torment and annoy the inhabitants.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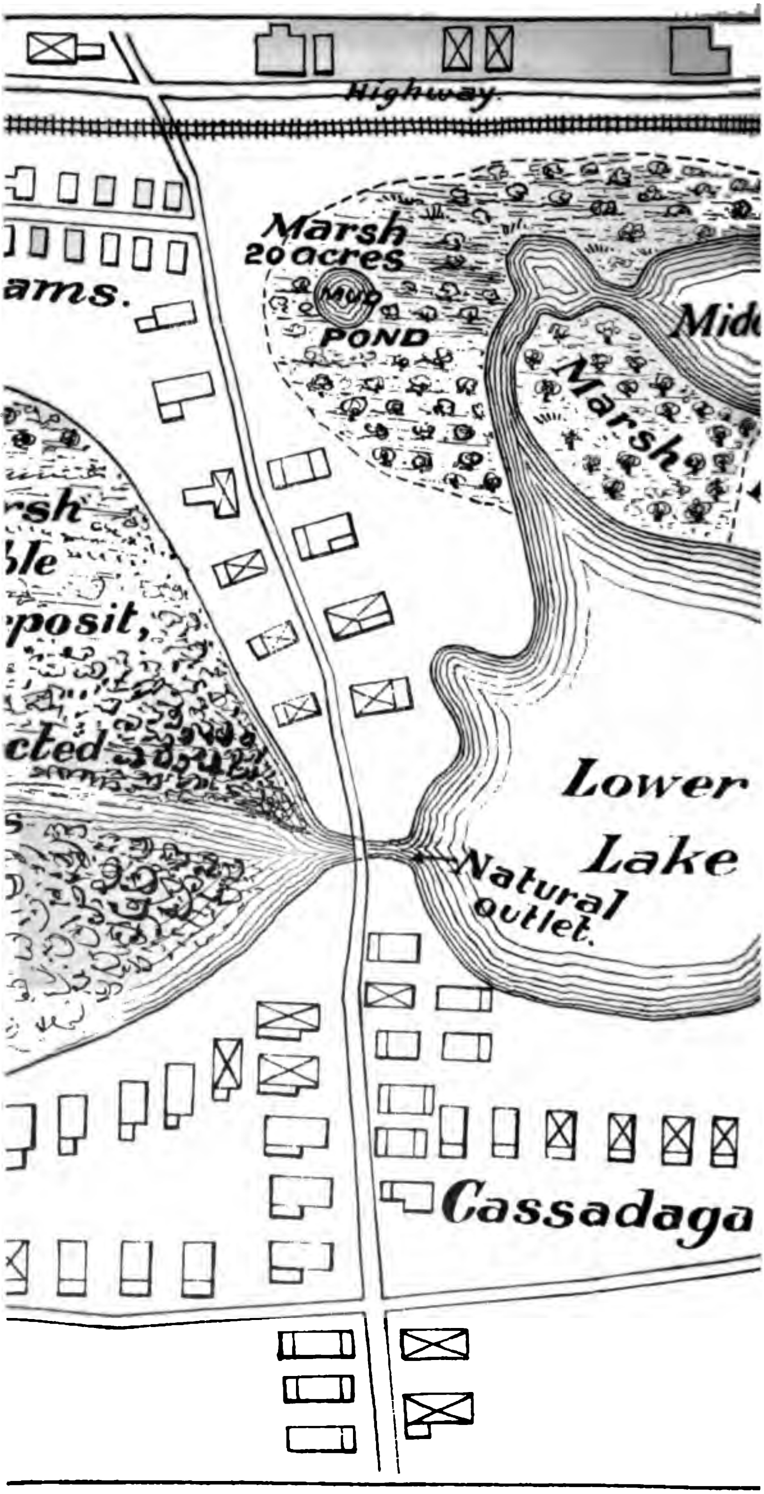

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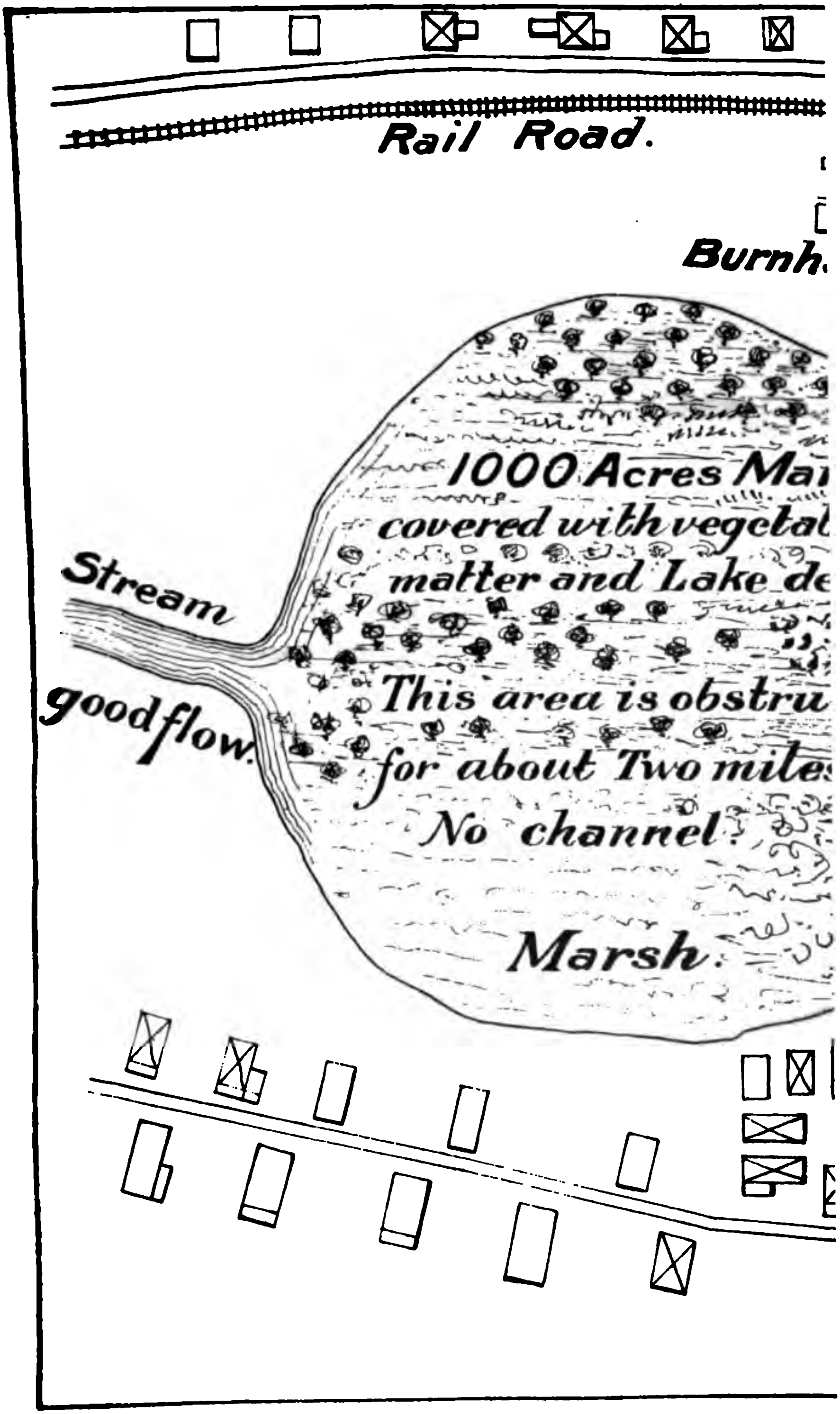
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covered with vegetal
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This area is obstru
for about Two mile
No channel.
Marsh.
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good flow.

Striking examples are related of serious result from the mos-ito bite. At a point two miles south, the fall is fairly rapid. is the opinion of the citizens with whom I conferred, viz.: M. Payne, justice of the peace; Dr. O. C. Shaw, health officer; C. Warren, supervisor; H. B. Beebe, architect; E. L. Griswold, stmaster, Lilly Dale; W. H. Bach, editor of the Sunflower, lly Dale; Charles Skiff, capitalist; Walter Waite, citizen; Har-on Van Buren, citizen, and J. W. Beebe, banker, that to afford lief between this point and the immediate outlet where the ob-ruction to the channel exists, can be removed only by dredging it the channel and thus draining the territory in question.

From the foregoing information, derived as herein stated, and om my imperfect observation because of the snow, it bears evi-nce of a colossal nuisance and menace to public health.

Kindly find appended a sketch of the territory described.

Respectfully submitted

WM. E. JOHNSON

Secretary State Department of Health

January 27, 1902

January 28, 1902

Wm. E. Johnson, *Secretary State Department of Health,*
Waverly, N. Y.:

Dear Sir—I am in receipt of your communication of the 27th st. enclosing your report upon an investigation as to the alleged nsanitary conditions at Cassadaga.

Very respectfully

DANIEL LEWIS

Commissioner of Health

By T. A. Stuart

Chief Clerk

VILLAGE OF MARATHON

SCHENECTADY, N. Y., *February* 19, 19(

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N.*

Dear Sir—The papers in the case of the alleged unsanit conditions existing in the village of Marathon arising froı change of the creek bed having been referred to me for invest tion, I beg to report that I visited the place on February and met the president of the board of trustees, the health offi the village attorney, and Messrs. Frank Corwin and Henry G: two of the citizens who had filed complaints in your office (cerning the matter. The village of Marathon is situated in C land county, on the D. L. & W. R. R., 50 miles south of Syrac on the Tioughniogo river. The village was incorporated in 1 under the General law; was reincorporated under the act of 1: and is now under the General village law of 1897. The pop tion of the village is about 1200. Although the railroad is on west side of the Tioughniogo river, the principal part of the lage lies on the east side, but near the river. Dividing eastern part of the village is a small stream called Hunt's cr flowing westerly and through the village for upwards of a mile and emptying into the river. On this stream and near village were until recently two mill ponds. The upper on(these was destroyed by a freshet a few years ago, and the res ing flood carried the accumulated debris from the upper p thus destroyed down into the lower pond which lay just on eastern edge of the village. This lower water power and p were owned by David Hillsinger of Marathon. A year or so a freshet injured the dam of this lower pond so that it could be used, and was never afterward repaired. Even before thi: jury the mill could only be used a portion of the time on acc(of the shortage of water. So far as could be learned no s were ever taken by Mr. Hillsinger to remove the gravel which been washed into his pond by the breakage of the pond above, to recover damages for such injury from anyone. On Decei

5, 1901, there occurred an unprecedented storm which raised the creek above all ordinary freshets; this is said by the local residents to have been the heaviest rain and flood since 1865, with possibly one intervening exception concerning which there is some difference of opinion. This flood of December 15th practically destroyed the Hillsinger dam and carried the accumulation of gravel and creek debris down stream, scattering large amounts of it along the bed of the creek from the site of the dam to the river, thereby raising the bed of the creek from three to seven or eight feet. The character of this deposit appears to have been sufficiently impervious to a free flow of water through it to cause the creek to flow along over it, though probably water percolates slowly through the material as it is somewhat porous.

This raising of the level of the flow-line of the creek has caused the ground-water, which formerly was allowed to drain freely into the creek at an elevation low enough to avoid injury to adjacent residents, to back up and to flood many cellars in the general vicinity of the creek and to produce an extremely unsanitary condition in those houses.

The following is a list of the properties suffering from wet cellars due to the change in creek bed, as furnished me by the retiring health officer, Dr. R. L. Smith, who has just resigned the office on account of intended removal to Brooklyn:

LIST OF PROPERTIES SUFFERING FROM WET CELLARS

Clark Burgess. Abuts on creek.
E. L. Salisbury. Abuts on creek.
Swift & Co. Abuts on creek. Cortland street.
Marathon house hotel. Abuts on creek. Cortland street.
Mrs. Geo. Hulbert. Abuts on creek. Main street.
Mr. Geo. Webster. Abuts on creek. Main street.
M. E. church property. Abuts on creek. Main street.
Presbyterian church property. Abuts on creek. Main street.
Baptist church property. Abuts on creek. Main street.
Public school property. Abuts on creek. Main street.
Mrs. Baker. Abuts on creek. Cortland street.
Messrs. Seamans & Main. Does not abut on creek. Cortland street.

Messrs. Baker Bros. Does not abut on creek. Main street.
Mr. Henry Gray. Does not abut on creek. Main street.
Messrs. Swift & Co. Does not abut on creek. Main street.
Public library building. Does not abut on creek. Main street.
Mr. Fred Swift. Does not abut on creek. Brink street.
Mr. E. L. Courtney. Does not abut on creek. Brink street.
Presbyterian parsonage. Does not abut on creek. Brink street.
Mr. C. H. Benton. Does not abut on creek. Broome street.

The village board of health has taken no official action toward declaring the conditions existing a nuisance nor toward abating the conditions. Dr. Smith, however, stated very distinctly that in his opinion the conditions were decidedly detrimental to health and should be abated. He also stated that he had spoken to the village trustees about the matter, requesting them (informally) to restore the creek, but that on the trustees taking the position that they were not responsible for the removal of the gravel in the creek, the village board of health had gone no farther as they did not know what to do.

On calling on Mr. C. E. Boyden, the village president, he stated that on his board being requested by certain residents suffering from wet cellars to restore the creek to its normal condition, legal advice was taken on the question of the liability of the village corporation for the restoration of the creek and the removal thereby of the cause of the wet cellars, with the result that the board of trustees decided not to assume the responsibility for the removal of the accumulation of gravel in the creek except where the creek crossed the public streets, on the ground that the village corporation had no authority either to enter on the lands of private parties in the creek bed to make a public improvement, nor to expend public money for work which it was the duty of the private owners of the creek bed to do. In answer to my inquiry whether the board of trustees, acting on that belief, had ordered the owners of the abutting property or the owner of the broken dam to remove the cause of the trouble, the president replied that it had not, fearing litigation as a result, and expressed the belief that when spring opened the trouble would be removed by parties most interested. In support of the position above mentioned, the president referred me for information to a recent similar case in the city of Ithaca, where the same storm had caused a creek to overflow its banks in the city and to injure property, in which case, quite similar in the physical facts occurring, the legal authority of the city to protect against future recurrences was informally reported on by a committee of resident lawyers. Through the kindness of the editor of the Ithaca Journal I enclose herewith a clipping from that paper giving the report of the committee of lawyers.

I have no other facts in the Ithaca case, and do not know how similar or dissimilar that case may really be to the present case at Marathon. It would appear, however, that possibly there might be a proper distinction between the authority of a municipal government to remove and abate an actually existing unsanitary condition in one case, and the authority to make permanent improvements that would prevent future recurrence of the conditions in another.

The following is a list of the owners of property abutting on the creek along the portion where the bed has been raised by the gravel and debris brought down by the flood. The list has been furnished me by the village attorney, Mr. Henry Wilson, who will furnish a description of the respective properties from the county clerk's office at Cortland if requested to do so. I do not know whether you will need this information to enable a correct determination of the responsibility for the abatement of the unsanitary conditions or not, and so have not ordered the same.

LIST OF PROPERTIES ABUTTING ON CREEK ALONG OBSTRUCTED PORTION

James Livingston, Cortland street, north side.
E. L. Salisbury, Cortland street, north side.
Lottie Brown, Cortland street, north side.
Fred. H. and G. W. Swift, Cortland street, north side.
Mrs. Ella Baker, Cortland street, north side.
Mrs. Antoinette Carter, East Main street, south side.
Mrs. Annie Smith, Cortland street, south side.
George R. Burgess, Cortland street, south side.

J. J. and N. E. Hickey, Cortland street, south side.

Charles J. Tarble, Cortland street, south side.

Mrs. Mary Hulbert, East Main street, south side.

George Webster, East Main street, south side.

Baptist Church Society, East Main street, south side.

Presbyterian Church Society, East Main street, south side.

Union school district No. 8, East Main street, south side.

F. E. Whitmore, East Main street, south side.

The village officials are as follows:

Board of trustees: C. E. Boyden, president; Walter A. Brink, Ogden Underwood.

Village board of health: W. P. Tyler, president; A. C. Baker, Eugene Watros, Dr. Henry Field, health officer, appointed February 4, 1902.

In conclusion I have simply to recommend:

(1) That from the above facts and any others that may be found necessary, and may be available, the legal responsibility for the abatement of the unsanitary conditions reported be definitely determined.

(2) That on the determination of the responsible parties they be formally directed to abate the conditions complained of.

I am, dear sir,

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

ALBANY, *April* 28, 1902

HON. DANIEL LEWIS, *Commissioner of Health, Albany, N. Y.:*

Dear Sir—I beg to acknowledge the receipt of your letter of the 2d inst., relating to an alleged nuisance in the village of Marathon, enclosing a report made by Professor Landreth respecting his investigations thereof and requesting that you be furnished by this Department with an opinion as to the manner of abating the said nuisance, and particularly as to who should abate the same—the abutting property owners, or the village authorities.

The delay of this Department in acting upon your communication has been unavoidable, being occasioned by necessity of attending to other matters of pressing importance.

I have examined the report of Professor Landreth's investigaions with considerable care, and conclude, generally, therefrom hat the alleged unsanitary condition exists because the bed of he creek flowing through said village, by reason of an extraorinary flood, has been raised or filled up with gravel or debris whereby an inability exists to drain surrounding and adjacent remises having houses with cellars thereon into said creek, as ad formerly been the practice.

Whether said unsanitary condition is solely the result of inability to drain surface water from adjacent premises, and also ellars, etc., or is in part occasioned by the clogged condition of he bed of the creek so as to interfere with the flow of its waters, s not entirely clear.

Neither am I able, from a legal standpoint, at this time to determine where the real substantial nuisance exists.

By this I mean to suggest that while the report submitted seems very full, and the result of careful investigation, yet I cannot advise you as to whether the actual nuisance or unsanitary condition is to be regarded as existing upon each piece of property which cannot be drained, or in portions of the bed of the creek or along its entire bed through the territory in question. It would rather appear that nuisances exist upon the several pieces of property which cannot be drained, the cause thereof being the changed condition of the bed of the creek.

Whether such cause is so intimately and necessarily connected with the nuisance upon each piece of property as to literally make it—the condition of the bed of the creek—a nuisance, is an pen question.

In other words, this entire matter would seem to present a ituation for the judicial investigation and determination of a court, and this particularly in view of the decision in the case eople ex rel. John Copcutt v. The Board of Health of the City Yonkers, 140 N. Y., page 1.

In that case the powers of boards of health and local authorities are very fully discussed by the court. It is said: "Boards of health cannot, as to any existing state of facts, by their determination make that a nuisance which is not in fact a nuisance. They have no jurisdiction to make any order or ordinance abating an alleged nuisance unless there be in fact a nuisance. It is the actual existence of a nuisance which gives them jurisdiction to act. * * * It may be said that if the determination of a board of health as to a nuisance be not final and conclusive, then the members of the board and all persons acting under their authority in abating alleged nuisances *act at their peril; and so they do*, and no other view of the law would give adequate protection to private rights. They should not destroy property as a nuisance unless they know it to be such, *and if there be doubt whether it be a nuisance or not the board should proceed by action to restrain or abate the nuisance, and thus have the protection of a judgment for what it may do.* * * * The result of these authorities (referring to decisions of other courts discussed) is that whoever abates an alleged nuisance and thus destroys or injures private property, or interferes with private rights, whether he be a public officer or private person, unless he acts under a judgment or order of the court having jurisdiction, does it at his peril, and when his act is challenged in a regular judicial tribunal it must appear that the thing abated was in fact a nuisance. This rule has the sanction of public policy and is founded upon fundamental and constitutional principles."

It is therefore apparent that the proper course to pursue in a matter of this kind where a question of doubt exists as to whether or not a particular condition at a specified place (in this instance the bed of the creek) constitutes a nuisance, is for the local authorities to obtain an adjudication of a court upon the subject in an action brought for the purpose of restraining or abating the alleged nuisance.

This subject, including the right of public authorities to compel the dredging of a creek bed which has become clogged, is considered in the case of city of Schenectady v. Furman, 61 Hun, 171, affirmed in 145 N. Y., 482.

It is to be inferred from that case, however, that the alleged uisance complained of was not inability to drain, but rather aused by failure of the creek, because of the clogged condition of its bed, to carry off its own water.

This entire matter would seem to present a situation hardly justifying the institution and carrying on of an expensive litigation upon the part of the authorities. Neither ought it to be necessary or deemed advisable for such authorities to adopt or pursue a course which would be likely to result in litigation. Rather should the parties interested and affected by the alleged condition which is complained of get together, and by co-operation with those in charge of the affairs of the village, agree, amicably, upon some course which would easily and economically remedy the entire difficulty.

Very truly yours
JOHN C. DAVIES
Attorney-General

May 1, 1902

Mr. EUGENE WATROUS, *President Board of Health, Marathon, N. Y.:*

Dear Sir—Complaint having been made to this Department of the existence of alleged unsanitary conditions in the village of Marathon, arising from a change of the creek bed in such village, Prof. Olin H. Landreth, one of the consulting engineers of this Department, visited Marathon for the purpose of investigating and reporting upon the complaint received.

A copy of Professor Landreth's report is herewith enclosed for the information of your board, also copy of the opinion given by the attorney-general to whom Professor Landreth's report was referred.

In view of the opinion as given by the attorney-general it is advised that your board act upon the recommendations made by the attorney-general, and contained in the last paragraph of his reply to this Department.

It would seem that by co-operation on the part of the village authorities and the owners of property abutting on the creek, satisfactory arrangements could be made whereby the accumulation of gravel could be taken from the bed of the creek and used on your village streets, thereby abating the nuisance and preventing any litigation in the matter of damage to certain properties injured by reason of the present unsanitary condition of the creek.

Very respectfully
DANIEL LEWIS
Commissioner of Health

VILLAGE OF TIVOLI

Engineering school of Union college

SCHENECTADY, N. Y., *November* 15, 1902

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the complaint of an alleged defective drain in the village of Tivoli, Dutchess county, N. Y., and the proposed installation of a sewer system for the village which you requested me to investigate some time ago, I beg to report as follows:

Tivoli is a small village situated near the northern line of Dutchess county, one mile east of the Hudson river, and on a small stream which flows southerly through the village and thence westerly to the Hudson river, which it enters near the village. The population in 1900 was 1153, having decreased from 1350 in 1890. A very good physical description of the village, with a sketch map, is contained in a report made to the State Board by Mr. O. S. Wilson, civil engineer of the Board, on June 9, 1887, and printed in the eighth annual report of the State Board of Health, on page 77. The present complaint relates to defective drainage at a point just west of and adjoining the premises marked "N" on Mr. Wilson's map. The drain shown by the dotted line running easterly from the point "L" on the sketch map, originally flowed easterly across Wall street, thence along the rear of the lots on the east side of Wall street which face southerly on Mill street, thence diagonally across some of the lots and entering the street where it joined another drain flowing easterly along the south side of the road, entering the creek under the mill. This drain for a portion of its length in the rear of the lots east of Wall street is an open drain, but in the remaining parts was a tile pipe drain, originally intended for surface and ground drainage, but later made offensive by the improper admission of sewage to it. This use of the drain had been made without any authority given by the village officials, and it is not understood that the village ever accepted or considered the drain as a village drain, but simply one built by private individuals in co-operation. All of the evidence attainable, as well as a close examination of the topography, goes to show that the covered drain along the rear of the lots west of Wall street occupies the place of the original natural watercourse, and that it therefore had the rights of a natural watercourse. In 1888 David Afflick, the owner and occupant of the premises marked "T" on Mr. Wilson's map, brought suit against the village of Tivoli for an injunction to restrain the village from emptying into this drain flowing under his house unwarrantable amounts of surface water, and against "carrying on or over said premises of plaintiff any foul or unwholesome matter so as to cause any foul or unhealthy odor to arise in and around said premises, and for other relief, etc., etc." Upon trial before Judge J. F. Barnard, a justice of the New York supreme court, a decision was rendered in favor of the defendant, evidently on the ground that the village was not liable for the injuries claimed. The plaintiff then brought suit in the same court against one of the owners of lots above the plaintiff, viz., Addison H. Coon, whose lot lay east of Wall street but west of Afflick's, the plaintiff's, for apparently the same sort of relief. In his judgment the judge, also Judge J. F. Barnard, gave an injunction restraining perpetually the defendant, Coons, from "in any manner leading to, flowing in, or throwing in any foul or offensive water or other substance or liquid in the stream or watercourse running over or through his lands and premises in the village of Tivoli, described in the complaint herein. . ." In the case of Afflick against the village of Tivoli, Judge Barnard had found the portion of the stream under consideration in the suit to be a natural watercourse.

The case of Afflick against Coon was tried on June 10, 1889. On December 7, 1900, Mrs. Sarah Afflick, the widow of the plaintiff, David Afflick, submitted a complaint to the village board of health of Tivoli, complaining of the serious pollution of the stream flowing under her residence, and calling especial attention to the "drain of Mrs. Jennie Saulpaugh." On December 10, 1900, the board of health took action on Mrs. Afflick's complaint, and issued orders against a number of persons residing along the drain, and among them one against Mrs. Jane Saulpaugh, of which the following is a copy: "Tivoli, N. Y., December 10, 1900. To Mrs. Jane Saulpaugh, Tivoli, N. Y. You are hereby required within three days to abate a nuisance on your premises on Wall street in the village of Tivoli, viz.: To remove your privy from a drain running from your premises and to close all drains or pipes leading or carrying wash-water, slops, or any illegal refuse in said drain, or the same will be done and the expense thereof collected from you, together with the penalty of neglect in relation thereto. By order of the board of health of the village of Tivoli, N. Y. Edgar Ellsworth, president."

Mrs. Saulpaugh naturally interpreted the order to close the drain running through her premises, and this interpretation was the one intended by the board of health as stated to be by a former member of the board, Mr. Simon Dengler, but denied by President Ellsworth. The closure of this natural watercourse caused the surface water and sewage to accumulate and back up on the premises of the owners above the Saulpaugh lot, and especially to back up onto the premises of Mr. C. C. Champlin, the adjoining owner on the west of Mrs. Saulpaugh.

It is charged that sewage is discharged into this drain from the Champlin premises and from numerous others above the Saulpaugh lot, and I have no reason to doubt this from what was visible on the day of my visit and from Mr. Wilson's more exhaustive examinations of the several drains. While this discharge of sewage into the drain would appear to be a proper subject for a restraining order by either the board of health or the courts, as a matter of fact the order of the Supreme court was not directed against Mrs. Saulpaugh nor the upper owners, but simply against Coons, and the order of the board of health to close the drain would appear to be without warrant or authority as it is a natural watercourse, though it would of course have the right, and it should be its duty, to prohibit the discharge of sewage or refuse into the drain if such discharge thereby caused a nuisance or unsanitary conditions, as I have no doubt was the case when the order to Mrs. Saulpaugh was given.

The conditions brought about by the closing of the drain by Mrs. Saulpaugh have caused serious complaints, and demands for the construction of a system of sewerage for the village have been made by some of the citizens, not only on account of the conditions on the Champlin and the adjoining lots, but at one or two other places in the village, one of these being on the south side of Mill street, where a drain receives drainage and sewage from houses on the south side of Mill and Broadway, and produces unsanitary conditions. While the needs for sewerage for these parts of the village are undoubted, such can hardly be said for the entire village, though a complete system of sewerage would undoubtedly be of much benefit to the village at large. A serious difficulty in the way of sewerage in the village lies in the fact that the village has no public water supply whatever, the entire population being served by private wells and cisterns with filters, the latter being few in number. The wells are mostly in clay and unavoidably gather much surface water and water from the upper ground levels, a condition unfavorable to purity of the wells. It would doubtless be a very excellent improvement if the village were to find itself in condition to install a good system of public water, and this in fact would be a necessity if a sewer system were to be built. It would not be permissible to install the sewer system without a source of supply for flushing the filters as the quantity of the sewage as well as its character would not be adequate to keep the sewers clean where wells are depended on for water supply.

Before making final recommendations as to the question of the feasibility of a sewer system, it appears desirable to ascertain more definitely the quality of the well water of the village, and also the feasibility and cost of a system of water supply. If the wells should be shown to be of questionable character, and a system of public supply feasible, then sewers would seem to be warrantable, and I should then be prepared to recommend the preparation of sewer plans in accordance with section 260 of the Village law, and the construction of the system of sewers in accordance with section 264 (or preferably 263) and the following sections of the article X, relating to village sewers.

At present, however, I beg to recommend only the following:

(1) That the village board of health be directed to open the drain comprising the natural watercourse through Mrs. Saulpaugh's premises, which it had no authority to order closed.

(2) That the village board of health be directed to make an examination of the premises along this and other drains in the village, and where nuisances or unsanitary conditions are found to arise from the discharge of sewage, slops, wash-water, or other refuse into any such drains, or into places where such substances pass or flow into any such drains, the village board of health be directed to issue and enforce orders for the abatement of such nuisances and unsanitary conditions, and the provision by the owners of the premises whence such polluting material originates of other and sanitary means of disposal of such polluting materials.

(3) That the character of the water from a representative number of typical wells in the village be examined both bacteriologically and chemically by the State Department of Health, and that the samples be taken from proper wells by a representative of the State Department of Health.

(4) That in the event that such examinations indicate the well-water supply of the village to be generally below the desirable standard of quality, and particularly if such examinations reveal the presence or the probability of disease infection in the water of the wells, then the village trustees be directed to have made

an investigation and survey to determine the most suitable and feasible source of public water supply and the cost of the same, and to submit a report of the same to the State Department of Health.

I beg to return the papers in the case referred to me.

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

November 19, 1902

Mr. EDGAR ELLSWORTH, *President Board of Health, Village of Tivoli, Madalin, N. Y.:*

Dear Sir—I enclose herewith copy of a report made to me by Prof. Olin H. Landreth upon his investigation as to defective drainage in the village of Tivoli.

The report of Professor Landreth has been approved by me, and you, as presiding officer of the board of health of the village of Tivoli, are requested to convene such board that proper action may be taken to carry out recommendations 1 and 2 of the report of Professor Landreth.

Very respectfully

DANIEL LEWIS

Commissioner of Health

ISLE OF WIGHT

Lawrence Beach

SCHENECTADY, N. Y., *June* 30, 1902

Dr. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—I beg to submit the following report of my examination into the alleged unsanitary conditions complained of at Isle of Wight, L. I., together with my recommendations concerning the same.

I visited the place on May 17th, and by appointment met there the following persons:

Representing the cottagers at Isle of Wight: Mr. F. H. Smith, Jr.; Mr. R. W. Leavitt, Mr. H. W. Dawson, Mr. Washington Hull for A. S. Post, Dr. J. F. Hadley, U. S. A.

Representing the town board of health of Hempstead: Judge W. H. Gay, Mr. Edward Wright, Mr. Geo. C. Tatem, Mr. B. V. Clowes, Town Clerk H. L. Weeks, Dr. Wm. Rhame, health officer.

Representing the village of Lawrence (adjoining): Mr. E. M. Bentley, president board of health; Mr. John Lawrence, Dr. J. Carl Schmuck, health officer.

Representing private landowners: Mr. John Lawrence, Lawrence, L. I.

The conditions I found there, and those stated to me, are as follows: Isle of Wight is a small unincorporated village lying on the south shore of Long Island and northeast from Far Rockaway. The location of the village or hamlet is surrounded by salt marshes and is separated from the seashore by a salt meadow, an arm of Long Beach bay, and the western end of Shelter island. A small tortuous tidal channel meanders past the northeast corner of the village and empties into Long Beach bay about two or three miles easterly from the village; this channel or tidal inlet is called "Crooked Creek." Its course was interrupted in 1895 by the building of a causeway or dyke running from the higher land north of the village to the beach crossing Long Beach bay by a bridge. No culvert or waterway was left through the causeway for the creek, and accordingly the upper end of the stream is now either filled up or is entirely disconnected from the lower or open portion. The material to make the causeway was taken from a long, narrow excavation on the easterly side of the causeway and caused or formed an artificial channel extending from Long Beach bay to the high land north of the village and intersecting the bed of Crooked creek. The tide rises and falls in this new channel or canal as it is called; and small boats navigate it, though it is claimed as private propy by Mr. John Lawrence, whose land it crosses. As the dis- ice from the bay to the intersection of the canal and creek is ich shorter via the canal than via the creek the tide rises or lows" in through the canal and ebbs through the same chan- , so that at flood tide the water is flowing down-stream in ooked creek, while during ebb tide the water is flowing up- eam in the portion involved lying near the village and the ek intersection with the canal. This fact was established by evidence of observers, and coincides precisely with what ould be expected from a careful examination of the channels of streams.

The hamlet of Isle of Wight numbers only fifteen or twenty uses, about twelve of which are connected with a system of wers built by co-operation of the owners of the cottages some enty years ago. The outlet of the sewer system formerly dis- arged into Crooked creek above the point of the present inter- tion with the canal, and when the causeway and canal were nstructed the sewer outlet was continued through the new useway and emptied into the new canal at a point near the eek intersection. The owner of the land occupied by the canal this point, Mr. John Lawrence, has disputed the right to have e sewer discharge at the new outlet, and it is stated has closed e outlet on several occasions as a means of enforcing his con- ntion. I did not verify this, but I know that Mr. Lawrence jects to the present point of discharge on the ground that it is his private land. During the past year or two the portion of e sewer extending from the last cottage to the causeway became bad order and sewage was allowed to escape from it onto the w land between the village and the causeway. This unques- nably caused an unsanitary condition along the line of the eaks, as there was no way for the exposed sewage to be re- oved by stream action, since whatever water is found there is ack water and rather inclined to be stagnant; at least there is circulation, since the upper end of the creek is now entirely it off from the lower part, or any direct tidal way. These con- tions caused many complaints from persons passing along the useway which is or has been extensively used by persons passing out to the bathing pavilions on the beach. The breaks in outlet or trunk sewer were repaired late in the summer of 1! and there has been little opportunity to discover by actual ob vation whether there still continues any substantial defects this part of the system, though it is charged by complaina that the leakage of sewage still continues. Complaints have a been frequently submitted to the town board of health of He stead, in which town the village of Isle of Wight lies, that discharge of sewage at the outlet into the new canal is in it highly objectionable to persons living near, and especially to sons passing along the causeway. At the time of my inspect the sewers had not been in use since the previous season hence there was no evidence of pollution at the place in questi While the total volume of the sewage from the entire villag very small compared with the tidal flow of the stream and probability of any serious conditions resulting therefrom are my opinion, very slight, still it should be remembered that as sewage will doubtless be mostly discharged during ebb tide solids will tend to pass out through the new instead of the channel, and since this is an artificial channel concerning public or private character of which there is unquestiona much contention, and since this channel also runs for a long tance along the causeway or avenue to the beach, it would ap desirable to take perhaps undue precautions against the foul of the banks by the discharge of crude sewage. There can be possibility of a sanitary harmful result from this sewage if solids can be avoided or provided for, and this can be done by residents of Isle of Wight by adopting modern methods of li faction of the solids before discharge, which is entirely wit their reach even with the low elevations of their sewer grades. had expected to receive from the representative of the cottag Mr. Hull, a copy of the original plans of the sewers said to h been made by Mr. C. T. Barrett of West New Brighton, S. I., fı which plan I expected to be able to determine whether it is sible to install improvements which should certainly meet difficulties, but as I have not received these plans I can only fine my recommendations to general terms.

I should have stated before that the board of health of the town of Hempstead on June 26, 1901, issued an order that the villagers of the Isle of Wight should disconnect their houses from the sewer system, and that the repairs of the sewers were made instead of complying with the order of the board. On March 17, 1902, this order was affirmed by the Hempstead board of health. This latter order you asked the local board of health to suspend during investigation. Under the broad principle that a local board of health may legally order the abatement of an actual nuisance, but may not indicate the manner of abatement or the remedy, there would appear to be a question whether the orders given were within the powers of the local board of health or not, and therefore whether the villagers have violated or refused to obey any rightful order or not. I do not assume that the answer to this question is of much importance at the present stage of the controversy, for it should be the purpose of all parties to the issue to reach an amicable solution of the question: "How can all reasonable danger of unsanitary and objectionable conditions arising from the Isle of Wight sewerage be avoided in the most inexpensive and feasible manner?"

My suggested answer would take the form of the following recommendations:

(1) That the citizens of the village of Isle of Wight incorporate as a sewerage district under the provisions of the law of 1902 providing for the construction of sewer systems in unincorporated villages.

(2) That the sewer commissioners of the new district proceed to take the necessary land to lead their sewer to the old bed of Crooked creek and secure an outlet into that stream instead of into the new canal.

(3) That the sewer commissioners also proceed to procure at once plans for the improvement of their sewer system to include three features: (a) The liquefaction of the sewage before discharge; (b) the detention of the discharge during flood tide and its automatic discharge during ebb tide; (c) the thorough automatic and continued flushing of the system, by either tide water or fresh water from the public water supply.

(4) That all plans for the improvement as well as the location of the new outlet be submitted to you for approval before being entered on.

These steps can be all carried out without delay if undertaken in earnest, and this plan would permit the owners of the land bordering on the new canal to close the stream at its intersection with the creek if they chose to do so and if it is established that they have the right.

There are numerous other facts submitted to me, but I have quoted all that I thought pertinent to the question, and beg to submit herewith all the correspondence and the papers in the case.

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

August 19, 1902

Mr. SMITH COX, *President Board of Health, Town of Hempstead, Hempstead, N. Y.:*

Dear Sir—This Department is in receipt of a communication under date of July 24, 1902, from Mr. H. Luther Weeks, secretary of the board of health of the town of Hempstead, in which he states as follows:

"At a meeting of the board of health of this town, held on Monday, July 21, 1902, the copy of Professor Landreth's report on the Isle of Wight sewage matter was presented, read and considered, and upon motion duly made, seconded, the same was ordered filed; it being the opinion of the board that as the people of the Isle of Wight had appealed from the order of this board to *you*, it was now for your Department to direct them as to their proceedings in disposing of their sewage."

As the duty of abating the nuisance in question devolves upon the board of health of the town of Hempstead, and in view of the evident intent on the part of that board to evade the performance of its duty, this Department is compelled to take action under section 25 of chapter 661 of the laws of 1893, as amended by chapter 29 of the laws of 1901.

Therefore, you, as presiding officer of the board of health of the town of Hempstead, are hereby requested to convene such board, which shall take such action as is necessary to cause to be carried out the recommendations of Prof. Olin H. Landreth, which were approved by this Department, and are as follows:

"(1) That the citizens of the village of Isle of Wight incorporate as a sewerage district under the provisions of the law of 1902, providing for the construction of sewer systems in unincorporated villages.

(2) That the sewer commissioners of the new district proceed to take the necessary land to lead their sewer to the old bed of Crooked creek and secure an outlet into that stream instead of into the new canal.

(3) That the sewer commissioners also proceed to procure at once plans for the improvement of their sewer system to include three features, (a) the liquefaction of the sewage before discharge; (b) the detention of the discharge during flood tide and its automatic discharge during ebb tide; (c) the thorough automatic and continued flushing of the system, by either tide water or fresh water from the public water supply.

(4) That all plans for the improvement as well as the location of the new outlet be submitted to the State Department of Health for approval before being entered on."

Very respectfully

T. A. STUART
Acting Commissioner of Health

Whereas, the State Department of Health has directed this board by a communication or order dated August 19, 1902, to take such action as is necessary to cause to be carried out the recommendations of Prof. Olin H. Landreth, which were approved by that Department, and which recommendations are hereinafter set forth in the following resolutions:

Resolved (1), That the citizens of the village of Isle of Wight incorporate as a sewerage district under the provisions of the law of 1902, providing tor the construction of sewer systems in unincorporated villages.

Resolved (2), That the sewer commissioners of the new proceed to take necessary land to lead their sewer to the of Crooked creek and secure an outlet into that stream ins into the new canal.

Resolved (3), That the sewer commissioners also pro procure at once plans for the improvement of their system, to include three features: (a) The liquefaction sewage before discharge; (b) the detention of the dis during flood tide and its automatic discharge during eb (c) the thorough automatic and continued flushing of the by either tide water or fresh water from the public water

Resolved (4), That all plans for the improvement as the location of the new outlet be submitted to the State ment of Health for approval before being entered on.

Resolved, That the secretary serve a copy of these reso on the owners and tenants of property on the Isle of Wig also send a copy to the Commissioner of the State Depart Health.

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port of Dr. H. W. Carey and Dr. Herbert D. Pease, upon their Investigations of an Epidemic of Dysentery in Westchester County.

Albany, N. Y., *November* 20, 1902

Daniel Lewis, *Commissioner State Department of Health, Albany, N. Y.:*

ear Sir—The undersigned respectfully submit the following ort on the investigations of an epidemic of a disease said be dysentery, prevailing in the town of Eastchester during month of August, 1902.

r. Carey, acting under instructions from Mr. Stuart, act- commissioner, proceeded to Tuckahoe on August 21st, and sulted with Dr. Granger, who had lodged the original com- nt. Together with Dr. Granger, a consultation was held ı Dr. Oliver L. Austin and Dr. Tupper, acting health officer Tuckahoe. Through the courtesy of Dr. Austin and Dr. per, the following information was obtained:

linical aspects of the cases—Patients in all stages of the ase were seen. In the acute cases the onset was fairly den and marked by frequency of the intestinal discharges ch at first were fluid and watery, soon, however, becoming dy and containing mucus. At the height of the disease in severe cases the intestinal discharges were composed of ost pure blood; in the milder cases only streaks of bloody cus were found.

he temperature of the body was only slightly elevated and ged between 99 degrees and 101 degrees. In only one of cases were chills or rigors noted. Vomiting was a frequent ptom and came on during the period when the intestinal harges were most frequent.

Relapses were frequent; the discharges from the intestin would abate for a few days and the general condition of the patient would improve only to be followed by a second attack equal if not more severe than the primary one.

Complications were rarely observed. Two cases showed definite septicaemia, and one of these died.

One case was complicated by an acute nephritis, which in all probability was an exacerbation of a scarlatinal nephritis from which the patient suffered during the preceding year. There were several instances where different members of one family were affected nearly simultaneously by the disease. In one family a mother and four children, in another, husband, wife and child.

All ages were affected, more children than adults however, in the proportion of about three to two. The disease was most severe upon the children and aged.

The duration averaged three weeks, the more severe cases were prolonged to five or six weeks. Loss of weight and weakness were marked features of the later stages of the disease.

The total number of cases could be estimated only approximately. In Tuckahoe, Bronxville and Mt. Vernon 150 would be a conservative estimate.

The percentage of mortality was fairly low, not more than 3-4%.

Many microscopic examinations of fresh intestinal discharges were made, but in no instance were amoebae or intestinal parasites found.

Specimens of the discharges were also collected in sterile test tubes for bacteriological examination.

Blood from the patients was also taken in order to test its agglutinating properties.

Distribution—The greatest number of cases were in the villages of Tuckahoe, Bronxville, and a fairly large number in Mt Vernon. Cases were also said to exist in Yonkers. As far as could be ascertained there were no cases above Tuckahoe.

In Tuckahoe the cases were widely separated, and on both sides of the Bronx river. No definite focus for the disease could be found. The poor and the well-to-do were affected alike.

ible sources of infection—In visiting the patients par-attention was given to the sanitary conditions of the Inquiries were made as to their drinking water, milk ›, with a view of finding some source common to all the o which the infection could be traced.

result of these inquiries briefly were as follows:*

king water—In a majority of instances city water from s known as the "Upper Reservoir" was used.

ples, therefore, of this water from both the reservoir and in the houses where the disease existed, were collected. iologic examination of these waters, however, failed to ither an excessive number of bacteria per cubic centimeter evidences whatever of sewage contamination. Well-water sed in several instances. The wells were carefully in-l, and where there was any question as to the purity of the as shown by the surroundings samples were collected and eriologic examination made.

two showed an excessive number of bacteria per cubic eter and sewage contamination.

—No one dairy supplied all the cases. Robinson's dairy ed more than any of the others. Samples of this milk were ied, but no evidences of organic contamination were t.

-A number of dealers were supplying ice to Tuckahoe, but idemic could in no way be traced to the ice of any one Furthermore, some of the same ice was used in neigh-towns, where very few if any cases of the disease existed. acteriologic examinations of ice were made.

ing the examination of these specimens it became evident more extended investigation was advisable.

efore on August 25th another trip was made by both the igned to determine more definitely

he geographical limits of the epidemic.

ny possible source of the epidemic.

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a detailed report of water and milk examinations, see appended

3. To obtain an autopsy upon a fatal case of the disease, and also to obtain more material for bacteriological investigation.

Dr. Bernard E. Mulligan, health officer of Yonkers, was consulted as to the number of cases of dysentery occurring within his jurisdiction. He assured us that there was no epidemic of dysentery in Yonkers, and a search through the death certificates of the previous two months revealed but one fatal case of the disease.

On further investigation this case was found to have originated in Tuckahoe.

In the absence of Dr. H. E. Smith, health officer of Mt. Vernon, Dr. Archibald T. Banning was consulted, and it was learned from him that there had been a considerable number of cases in the city of Mt. Vernon which had been considered true dysentery.

For further information relating to these cases we were referred to many of the local physicians.

Efforts to communicate with the larger number of them, however, failed.

Dr. O. S. Myers described two cases which he considered true dysentery.

Dr. Arch. Campbell gave a detailed history of one severe case with relapse, and briefly referred to several milder cases which had come under his personal observation. It was learned further that there had been two fatal cases at the Mt. Vernon hospital which had been considered as undoubtedly due to dysentery.

The clinical histories of these cases as given by these physicians agreed closely with the histories obtained from the cases in Bronxville and Tuckahoe.

Concerning a possible common source of infection in Mt. Vernon, it was learned that the cases occurred in widely separated parts of the city, in persons of varied occupations and ages.

Efforts to prove water, milk and ice supply common to the cases referred to were negative.

Efforts to trace the infection to the ingestion of oysters and clams which came from waters likely to be contaminated with sewage were unavailing.

On the following day (August 26th) we were enabled, through the courtesy of Dr. Austin of Tuckahoe, to make a post mortem examination upon a fatal case of dysentery.

Specimens for histologic and bacteriologic study were obtained. Through the courtesy of Dr. Tupper we were also enabled to examine five additional cases of the disease, and from these specimens of the intestinal discharges and blood were obtained. The cases gave histories agreeing very closely with those seen on the first visit.

The results of the bacteriologic and pathologic examination of the material collected in brief are as follows:*

Bacteriologic examination of intestinal discharges.

From the start three possible etiologic factors of the epidemic were always kept in mind, (a) Amoebae, (b) B. Pyocyaneus, (c) B. Dysenteriae (Shiga). As stated above no amoebae were found in the fresh specimens, so they were eliminated as a factor.

In order to determine the presence of the B. Pyocyaneus, and especially the B. Dysenteriae, the work of isolating the organisms should begin upon a fresh stool as soon as possible after evacuation.

The time element here is important, since the B. Coli Communis will in a few hours overgrow the B. Dysenteriae and greatly lessen the chances of isolating it.

In the present case considerable time of necessity was lost in bringing the specimens from Tuckahoe to the Bender laboratory.

The following method of isolation (as employed by Flexner in his work on tropical dysentery) was carried out:

A series of ten agar plates were made from each specimen and incubated for 24 hours at 37°. The colonies which developed at the end of that time were assumed to be B. Coli Communis, and were marked.

The plates were then incubated under the same conditions for another 24 hours. Cultures were made from all these new colonies which had developed during the second incubation.

In one instance the B. Pyocyaneus was found (vide infra). All the other cultures proved to be either B. Coli Communis or some other common intestinal organism, so that the bacteriologic examination of the intestinal discharges was quite negative.

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*For detailed report see appended report.

Autopsy—The patient was a child one year and four months of age. The onset had been sudden and the intestinal discharges rapidly became frequent and streaked with blood. The child had been under medical attention only for a short time before death, and further information as to the clinical symptoms could not be obtained. The result of the autopsy showed a marked congestion of the lungs, liver, spleen and kidneys. Marked swelling of the mesenteric lymph glands. Swelling of the lymph follicles of the large intestine, many of which had undergone necrosis in the center, leaving minute ulcers.

The microscopic examination of tissues taken from the organs confirmed the gross diagnoses.

The necrotic areas in the large intestine showed the blood vessels congested, and in some areas hemorrhage. The necrosis extended down into the submucosa, which showed thickening, oedema and a slight amount of hyaline degeneration. The musculature were not affected.

Sections stained after Flexner's method showed bacilli in the necrotic areas which corresponded in morphology to those of the colon group.

No amoebae could be demonstrated in the necrotic areas.

Cultures were made from the different organs at autopsy, and with the exception of the large intestine threw no light upon the nature of the infection.

The same method of double incubation was employed as in the examination of the fresh stools.

An organism was isolated from the cultures made from the large intestine which corresponded in cultural characteristics to the B. Dysenteriae (Shiga) and parallel cultures with the original Shiga organism obtained from Philadelphia showed no difference between the two.

As additional evidence, successful agglutination reactions were obtained, with serum from animals immunized against the B. Dysenteriae. The serum was kindly furnished by Dr. Flexner of Philadelphia.

organism isolated from the large intestine at autopsy was inated in dilutions of this serum as high as 1:100.

lutination reactions—The dried blood specimens from of the cases were used. Both the B. Dysenteriae and the cyaneus were used in the tests, for as mentioned above the organism was present in the stools from one of the cases. tions of 1:20 were used in each instance. The blood from tients in no case had any agglutinating power over the cyaneus. In the tests with the B. Dysenteriae the typical ination phenomena were observed in two cases. The re- g nine cases showed no agglutination.

same inconstancy of the agglutination reaction with dried specimens has been noted also by Bassett while investigat- senteric cases at the Mt. Wilson sanitarium in Baltimore the past summer.

clusions—In view of the foregoing facts the following con- s can be drawn:

he epidemic was one of true dysentery.

he results of the laboratory investigations of the intestinal rges and the blood are in accord with the work of those laim the B. Dysenteriae to be the cause of some forms of ery.

o far as could be determined the epidemic of dysentery was l to the towns of Tuckahoe, Bronxville, Mt. Vernon and mediate vicinity.

o sources of the infection whatever could be found.

Respectfully submitted

H. W. CAREY
HERBERT D. PEASE

APPENDED REPORT

Harriet Thorn. Age one year and four months. Died August 26th, at 7 a. m. Autopsy, 1 p. m. Service of Dr. Oliver Austin, Tuckahoe, N. Y.

Body—Seventy-seven cm. in length. Post mortem. Discoloration over back and posterior surface of legs.

Pupils—Dilated and equal.

Mucous membranes—Pale. Oedema of feet and legs.

Rigor mortis—Not present.

Peritoneum—On opening abdominal cavity both layers of peritoneum are smooth. No adhesions. No distention with gas or fluid.

Intestines—Not discolored.

Small intestine—Slightly distended. Mesenteric glands large and red, vary in size from 3 to 6 mm. in diameter.

Large intestine—Outer surface vessels congested and prominent. Mucosa covered with a yellowish mucus. Mucous membrane seems to be absent in places. Solitary follicles are elevated and enlarged, especially in the region of sigmoid flexure. In some instances the center of the follicles are depressed and appear to be necrotic.

Appendix—Seven cm. long. No adhesions on the outer surface. On section lymphatic follicles are swollen with depressed centers similar to the condition described in the large intestine.

Small intestine—Peyer's patches are distinctly swollen, but in no instance is there ulceration or necrosis.

Left kidney—Measures 6 x 3½ cm. Outer surface shows remains of foetal markings. Fibrous capsule not thickened and peels easily. On section cortex not thickened. Pyramids distinct. Malpighian corpuscles not visible. Blood vessels congested. Kidney substance bleeds easily.

Right kidney—Measures 5½ x 3½ x 2½ cm. Corresponds in every respect with left kidney. The adrenals are normal.

Liver—Measures 15 x 10 x 5 cm. Outer surface smooth. Consistency soft. Capsule not thickened. On section lobules are distinct. Blood vessels considerably congested.

Pancreas—Is normal in every respect.

Spleen—Normal in size. Capsule not thickened. On section malpighian corpuscles distinct. Pulp not increased.

Bladder—Empty. Appears normal.

Uterus, tubes and ovaries—Normal.

Aorta—Normal.

Thorax—On opening thoracic cavity both layers of pleura are smooth. No fluid in the pleural cavity.

Right lung—Measures 10 x 9 x 6 cm. Crepitant everywhere. On section lung tissue appears normal, except that it is considerably congested.

Left lung—Corresponds in every respect with right.

Thymus—Extends over the pericardium of the upper border of the right ventricle. On section appears normal.

Pericardium—There is an area 4 cm. in diameter which is uncovered by lung. On section both layers are smooth. No adhesions to the thoracic wall. No increase in the amount of pericardial fluid.

Heart—Measures 6 x 5 x 4 cm. Left auricle contained no thrombi. Endocardium smooth. Foramen ovale closed. Left ventricle wall 1 cm. thick. Muscle pale reddish. Aortic and mitral valves normal. Right auricle and ventricle normal.

Anatomical diagnosis—Passive congestion of the lungs, spleen, kidneys and liver. Follicular enteritis. Hyperplasia of the mesenteric lymph glands.

MICROSCOPIC EXAMINATION

Pancreas—Normal.

Liver—Cells of parenchyma normal. Marked distension of the hepatic vein and capillaries at center of lobule with blood.

Heart muscle—Normal.

Kidney—Cloudy swelling.

Lung—Marked distension of lung capillaries with blood.

Thymus—Marked congestion with considerable accumulations of eosinophilic cells, mostly polynuclear.

Large intestine—Mucosa, glands are for the most part normal, but over the solitary follicles they have broken down somewhat and contain polynuclear leucocytes. The interglandular stroma in these places has undergone necrosis. The necrotic areas extend down into the submucosa in the region of the solitary follicles. The blood capillaries of the solitary follicles are much dilated. The submucosa is thickened and slightly oedematous. The connective tissue cells appear to have undergone a slight hyaline degeneration. The musculature is not affected, neither is the peritoneal coat.

Small intestine—Normal.

Large intestine—In sections stained by Flexner's method bacteria were demonstrated in the necrosed areas which corresponded in shape and size to those of the colon group.

AUTOPSY BACTERIOLOGY

Cultures were made from the lungs, heart, liver, spleen, kidneys and large intestines.

Heart, spleen and kidneys—Sterile after 72 hours' incubation.

Liver and lungs—B. Coli Communis.

Large intestine—A series of 12 agar plates were made and placed in the thermostat at 37° for 24 hours. At the end of that time all the colonies were marked and cultures from them subsequently proved to be B. Coli Communis.

After a second incubation of 24 hours new colonies developed which were at once inoculated into fermentation tubes containing glucose bouillon.

After 24 hours several tubes contained gas and proved to be colon bacilli. One tube, however, developed no gas after 48 hours, and subcultures were made upon different culture media.

The cultural characteristics of this organism are as follows:

Agar—Slight growth along line of needle, white, opaque, elevated and moist.

Milk—Slight acid formation in first two days. Alkalinity developed after 10 days.

Neutral Red—No change.

Bouillon—Clouded.

Dunham—Slight indol formation.

Gelatin—Not liquefied.

Glucose Bouillon—No gas.

Lactose Bouillon—No. gas.

Saccharose Bouillon—No gas.

Morphology—Short bacillus, rounded ends. Sometimes in pairs.

By Gram—Decolorized.

Motility—Very slight.

Agglutination reactions with serum from animals immunized against the B. Dysenteriae (Shiga) showed that this organism was agglutinated in dilutions as high as 1:100 in less than two hours.

Cultures of this organism grown parallel with cultures of B. Dysenteriae (Shiga) showed no variations. Cultures from the intestinal discharges of dysenteric patients were treated in the manner (double incubation) but the B. Coli Communis and the pyogenic cocci were the only organisms found.

METHOD OF MAKING AGGLUTINATION REACTIONS

Dried blood was used in every test.

The culture used was one obtained from Flexner. One small loop of an 18-hour agar culture was inoculated into bouillon. The size of the loop was regulated so that in one field under the microscope not more than 10 or 20 organisms were present.

The blood was diluted with normal salt solution and the dilution was always 1:20.

Blood from 11 different cases was tested, and in two instances positive agglutination was observed, the remaining nine were negative.

The agglutination test was also used with the B. Pyocyaneus, but no positive reactions were obtained.

BACTERIOLOGICAL EXAMINATIONS OF WATER

Specimen from Upper Reservoir, Tuckahoe—Collected August 21. Examination begun August 23.

Number of bacteria per cu. cm.—Agar plates, 5440; Gelatin, 9440; average, 4720.

Theobald Smith's fermentation test—Ten glucose bouillon tubes were each inoculated with one cu. cm. of the suspected water. At the end of 48 hours no gas had developed in any of the tubes.

Remarks—Considering the time which had elapsed between the collection of the water and the beginning of the examination the bacterial count is not exxcessive. There were no evidences of organic contamination.

City water from faucet, Tuckahoe—Collected August 26, noon. Examination begun August 26, 8 p. m.

Average number of bacteria per cu. cm. 200.

Theobald Smith's fermentation test—Ten tubes were each inoculated with one cu. cm. of the suspected water. At the end of 48 hours no gas had developed in any of the tubes.

Remarks—Bacterial count low. No organic contamination. Good water.

Well, Whalen—Collected August 21. Examination begun August 23.

Average number of bacteria per cu. cm. 3900.

Theobald Smith's fermentation test—Ten tubes were each inoculated with one cu. cm. of the suspected water. At the end of 48 hours gas had developed in all the tubes, and in three the proportion of CO2 to H. corresponded to that formed by the B. Coli Communis.

Remarks—The bacterial count is not excessive. There are evidences of sewage contamination. Condemned.

Well, Cotter—Collected August 21. Examination begun August 23.

Average number of bacteria per cu. cm. on agar and gelatin plates 12,766.

Theobald Smith's fermentation test—Ten tubes were each inoculated with one cu. cm. of the suspected water. At the end of 48 hours gas had developed on all the tubes, and in one instance the proportion of CO2 to H. corresponded to that formed by the B. Coli Communis.

Remarks—A fairly high bacterial count. Evidences of sewage contamination. The sanitary surroundings of the well were very bad. Condemned.

Milk, Robinson's Dairy—Collected August 26, noon. Examination begun August 26, 8 p. m.

Average number of bacteria per cu. cm. 1,500,000.

Theobald Smith's fermentation test—Ten tubes were each inoculated with one cu. cm. of the suspected water. At the end of 48 hours no gas was developed in any of the tubes.

Remarks—Excessive bacterial count. No evidences of organic contamination.

BUREAU OF VITAL STATISTICS

Hon. Daniel Lewis, *Commissioner of Health, Albany, N. Y.:*

Sir—I have the honor to herewith tender report covering the work in the Bureau of vital statistics for the year 1902.

There are at present 1388 local boards of health in the state, outside of Albany, Buffalo, Greater New York and Yonkers, under the jurisdiction of the State Department of Health, representing 932 towns, 416 incorporated villages and 40 cities.

The Department has kept in close touch with the local boards of health during the year, keeping them supplied with registration blanks, instructing the registrars as to their duties, and urging a more complete registration of vital statistics.

During the year there were received 18,158 reports from the local registrars of vital statistics, and 1200 reports of contagious diseases from the local health officers.

While it seems an almost hopeless task to get complete registration of vital statistics in the towns, villages and cities in the state, the persistent efforts on the part of the Department to have a more complete registration has resulted in a marked improvement in this respect by many local boards in the country districts.

It is to be regretted that the same cannot be said of the cities. While it is true that some improvement has been made in the registration of some cities, it will be seen from the statistics filed from several of them that there is an unwarranted carelessness on the part of the city authorities in having the physicians and clergymen comply with the Public health law regarding the filing of vital statistics.

The statistics as reported by the cities in the state for the year 1902 are as follows:

'Y	Population	Births	Deaths	Marriages	Rate per 1,000 Population		
					Birth	Death	Marriage
....	94,151	1,215	1,623	696	13.0	17.2	7.4
....	20,929	389	349	199	18.0	16.7	9.5
....	30,345	495	469	337	16.3	15.4	11.1
n........	39,647	538	623	684	13.5	15.7	17.2
....	352,387	7,078	5,138	3,400	19.8	14.5	9 6
....	24,000	409	442	182	17.0	18.4	7 6
....	11,061	169	148	191	15.3	13.4	17 3
....	9,014	110	107	70	12.2	12.0	7.8
....	11,616	389	229	181	33.5	19.7	15.6
....	35,672	516	484	473	14.5	13.6	13.2
....	8,734	151	98	51	17.3	11.2	5.8
....	10,433	183	166	71	17.5	16.0	6.8
'.........	18,349	289	243	181	15.7	13.2	9.8
e........	12,000	212	154	123	17.8	12.8	10.2
....	9,528	160	181	97	16.8	19.0	10.2
....	13,136	181	210	131	13.8	16.0	10 0
....	22,892	452	257	594	19.8	11.2	26.0
....	10,130	159	134	63	15.6	13.2	6.2
....	24,535	502	401	206	20.4	16.4	8.4
....	10,381	120	88	77	11.5	8.5	7.4
....	16,581	405	228	174	24.4	13.7	10.5
....	14,522	200	246	124	13.1	17 0	8.5
....	20,346	443	307	167	21.2	15.1	8.2
....	25,000	394	475	248	15.7	19.0	9.9
lle.......	14,720	376	232	117	25.5	15.7	7.9
....	3,632,501	85,643	68,112	36,206	23.6	18.7	10.0
ls.......	19,457	489	383	412	25.1	19.1	21.1
wanda...	9,069	197	108	89	21.7	12.0	9.8
;.........	12,633	235	190	112	18.5	15.1	8.9
....	9,462	145	116	209	15.2	12.2	22.0
....	7,942	129	109	68	16.2	13.8	8.6
....	22,200	379	323	154	17.0	14.6	6.9
....	8,434	209	113	141	24.7	13.5	16.7
ie......	24,029.	478	422	234	19.9	17.5	9.7
....	10,000	166	164	75	16.6	16.4	7.5
....	162,608	2,906	2,222	1,613	17.8	13.6	9.8
....	15,343	313	267	126	20.4	17.3	8.2
v........	47,625	888	663	310	18 6	14.0	6 6
....	108,347	1,692	1,509	676	15.6	14,0	6 2
....	75,057	796	1,433	527	10 6	19.0	7.0
....	56,383	1,130	981	409	20.0	17.3	7.2
....	21,700	402	317	246	18.5	14.6	11.3
....	14,321	127	215	57	8.9	15.0	4.0
....	47,931	1.175	866	427	24.5	18 1	8.9

the above figures it may be readily seen that the regis- in some of the cities is far from being complete, and in it is unsatisfactory.

REGISTRATION OF DEATHS

'egistration of deaths in the state is accepted as suffi- complete for statistical purposes. A comparison of nber of deaths reported to the State Department of from the counties and cities outside of Greater New with the report issued by the United States census for the year 1900, shows that there were but about aths occurring in the territory mentioned which were orted to the State Department. While this is considered close registration, the Department is putting forth every effort to overcome this deficiency.

The report issued by the census bureau mentions New York as one of the few in which the registration of deaths was complete enough to form an accurate basis for statistical purposes.

REGISTRATION OF BIRTHS

The registration of births is the most incomplete and unsatisfactory. From correspondence had with the registrars of several cities in the state as to the completeness of their registration, and from the information gained by a comparison of the registration in certain rural districts where it is known to be nearly complete, it is fair to estimate the actual birth rate for the state to be 25 per 1000 population. This would indicate that there are about 35,000 births occurring in the state each year that are not reported to the local boards of health. Of this number, it is estimated about 24,000 occur in Greater New York.

During the year representatives of the Department visited many parts of the state where the registration was known to be incomplete, and the result has been a marked improvement in the reports received from those localities in almost every instance.

Could the whole state be covered in this manner, no doubt in a few years the registration of births would be satisfactory.

REGISTRATION OF MARRIAGES

While the registration of marriages is more complete than that of births, it is unsatisfactory. The local boards of health have been urged by the Department to see that there is a more complete registration of marriages, as well as births, and there has been an improvement during the year in that respect. While it is very difficult to obtain the actual marriage rate, from information gained it is fair to assume it to be 12 per 1000 population. Although the rate is higher than this in some of the cities in the counties bordering on other states, it is due to the large number of people coming into this state from adjoining states to be married.

estimated that outside of Greater New York there were 000 marriages performed in the state during the year ere not reported to the local boards of health.

STATISTICS FOR STATE

ital statistics reported to the State Department of Health is as follows:

	Births	Marriages	Deaths
	13,587	6,179	11,719
	11,486	4,973	10,794
	11,959	4,033	10,753
	10,671	5,673	10,403
	11,221	5,125	11,542
	11,164	7,220	9,221
	13,626	5,736	11,674
	12,103	4,419	10,209
r.	12,109	6,132	9,466
	14,441	6,926	10,189
	11,763	6,553	8,815
	12,579	5,910	9,731
	146,709	68,879	124,516

eful estimate of the actual number of births, deaths and es occurring in the state during the year 1902, in round , is: Births, 180,000; deaths, 130,000; marriages, 85,000.

RURAL DEATH RATE

tatistics filed from the registration districts of the counties tate, outside of the cities, show the following death rate) population:

	Rate
	15.4
y	13.5
	16.2
ugus	13.3
	15.3
qua	13.0
g	16.4
go	17.2
	8.0
ia	16.3

County	Rate
Cortland	15.6
Delaware	14.6
Dutchess	19.5
Erie	13.6
Essex	15.2
Franklin	15.8
Fulton	16.7
Genesee	15.2
Greene	16.8
Hamilton	11.0
Herkimer	13.5
Jefferson	14.6
Lewis	14.0
Livingston	13.9
Madison	16.0
Monroe	14.1
Montgomery	12.5
Nassau	15.5
Niagara	13.3
Oneida	14.2
Onondaga	14.6
Ontario	13.8
Orange	12.9
Orleans	15.1
Oswego	17.3
Otsego	17.0
Putnam	16.0
Rensselaer	16.4
Rockland	15.0
St. Lawrence	14.4
Saratoga	14.7
Schenectady	15.8
Schoharie	16.0
Schuyler	16.2
Seneca	20.0
Steuben	14.4
Suffolk	16.7
Sullivan	16.0
Tioga	16.5

	Rate
s	15.0
	16.4
	9.0
gton	16.0
	14.5
ster	15.7
g	15.3
	14.2

DEATH RATE IN STATE INSTITUTIONS

ollowing table shows the death rate in the larger of the stitutions:

Institution	Inmates	Deaths	Rate per 1,000
State Prison	1,186	8	6.7
nton State Hospital	1,382	101	73.0
gdale Asylum	329	18	54.7
State Hospital	1,814	150	82.7
olony	762	33	43.3
ora Hospital	154	1	6.5
Reformatory	1,448	7	4.8
a State Hospital	354	30	84.7
River State Hospital	2,107	174	82.5
Island State Hospital:			
ark	2,810	186	66.2
n	1,187	103	86.7
attan State Hospital:			
	1,824	263	144.2
	2,094	146	69.7
Islip	2,508	136	54.2
an State Hospital	601	17	28.3
own State Hospital	1,272	60	47.1
rk State Soldiers and Sailors'	1,681	170	101.1
er State Hospital	605	76	125.0
rence State Hospital	1,681	146	86.8
ng Prison	998	7	7.0
tate Hospital	1,124	93	83.6
State Hospital	2,253	144	63.9

CONDITION OF WORK

The condition of the work in the Bureau is most satisfactory. During the year there were received and acknowledged 18,158 reports of vital statistics from the local registrars. The certificates received from the registration districts outside of the cities of Albany, Buffalo, Greater New York and Yonkers, were:

Births	51,932
Deaths	48,976
Marriages	28,368
	129,276

During the year there were 171,882 certificates indexed and properly filed for safe-keeping; all delayed certificates received were indexed under proper years, and there were added to the card index system 236,179 cards.

DEFECTIVE CERTIFICATES

The carelessness of the physicians and clergymen in properly filling out certificates and the local registrars in accepting of such returns has been overcome, to some extent, by the persistent efforts of the Department in returning defective certificates and insisting upon the records being made complete. All certificates received during the year were carefully examined and there were 1,365 returned for correction.

DELINQUENT REGISTRARS

While it is to be expected that among some 1400 local registrars of vital statistics, covering all parts of the state, there would be some who were remiss in their duties, every effort has been put forth to have the registrars secure complete returns in their respective municipalities, and forward same to the State Department of Health each month, and there has been an improvement in this respect, reports having been received regularly each month from nearly all of the registrars. During the year there were 2506 delinquent notices mailed to registrars.

It has been found that personal interviews with registrars covering the subject of securing complete returns of births, marriages and deaths makes a more lasting impression than through correspondence. The Department has, therefore, decided to have one or more of its representatives visit the local registrars for the purpose of examining their books, inquiring as to methods adopted for securing local reports and give detailed instructions as to the requirements of the law as to vital statistics, and as to the duties of the local boards of health in the matter of enforcing compliance with such laws.

NEW FORM OF DEATH CERTIFICATE

During the year, upon the recommendation of the United States census bureau, a new form of death certificate has been prescribed for use of local boards. The information asked for on the new blank, if furnished, will be of great advantage statistically, and is on lines which, it is hoped, will be general throughout the country, as the census bureau is recommending the adoption of a uniform death blank by all of the states.

TRANSCRIPTS

During the year there were requests received for transcripts of 382 certificates, to be used for legal and administrative purposes.

EXPRESS AND MAIL SHIPMENTS

The following packages, containing supplies for registration of vital statistics, reports, etc., were shipped by the Department during the year:

By express	2,987
By mail	2,000
	4,987

ROSTER OF LOCAL BOARDS OF HEALTH

Upon the expiration of the terms of office of the members of the local boards of health notices have been mailed to the presidents of the boards requesting a list of the newly organized boards. By this means a complete roster of the local boards of health in the state is kept on file in the Department.

Respectfully submitted

F. D. BEAGLE

Registrar of Vital Statistics

FOOD AND DRUGS

REPORT

OF

WILLIS G. TUCKER, M. D. Ph.D.

irector Bureau of Chemistry, New York State Department of Health.

ANIEL LEWIS, M. D., *Commissioner New York State Department of Health, Albany, N. Y.:*

Sir—During the year ended December 31, 1902, 52 samples of vater and four samples of sewage, from various parts of the state, nost of them sent by local boards of health, have been analyzed, ind the results have been promptly reported to the senders, and will now be found appended to this report. Fifty-two samples f kerosene oil, collected in various localities, and in most instances from retail dealers, have been examined, and particular ttention is called to the results of these examinations herein tated, which clearly indicate that considerable oil of inferior nd illegal quality is sold in this state. Such sales constitute a erious menace both to life and property, and the matter is one f grave importance, deserving further investigation and such ction as may prevent the sale of inferior and unsafe oil for the rdinary uses of kerosene. Seventy-six samples of food articles have been examined during the year, and the director has made official inspections in various localities and given information to many correspondents on matters relating to food and drug adulteration, water supply and pollution and kindred topics which have been referred to him from time to time. Much important work that ought to be undertaken has, of necessity, been left undone through lack of proper appropriations to defray its cost. A summary of the work done during the year is now transmitted, as follows:

January 13. Received two samples of water from Mr. G. C. Mills, assistant engineer Plattsburg improvement commission, Plattsburg. Ordered examined January 14. Analyzed and reported upon January 21.

January 22. Received sample of water from Dr. J. L. Hanmer, health officer, Middletown. Ordered examined January 23. Analyzed and reported upon January 29.

January 29. Received sample of filtered water from F. W. Robertson, general superintendent, New York state reformatory, Elmira. Ordered examined January 31. Analyzed and reported upon February 6.

February 6. Received sample of water from Dr. J. L. Hanmer, health officer, Middletown. Ordered examined February 7. Analyzed and reported upon February 11.

February 14. Received sample of water from H. S. Braman, health officer, Homer. Ordered examined February 17. Analyzed and reported upon February 21.

March 20. Received sample of water from Dr. J. W. King, health officer, Stottville. Ordered examined March 20. Analyzed and reported upon March 24.

March 28. Received sample of water from Dr. H. F. Kingsley, health officer, Schoharie. Ordered examined March 28. Analyzed and reported upon March 31.

April 5. Received sample of water from Dr. O. W. Petersen, health officer, Waterloo. Ordered examined April 5. Analyzed and reported upon April 12.

April 7. Received sample of water from Dr. J. W. King, health officer, Stottville. Ordered examined April 8. Analyzed and reported upon April 12.

April 17. Received three samples of water from Dr. J. W. King, health officer, Stottville. Ordered examined April 18. Analyzed and reported upon April 23.

Received sample of water from Dr. J. M. Townsend, health officer, Trumansburg. Ordered examined April 22. Analyzed and reported upon April 25.

April 24. Received four samples of water from Dr. John Archibold, health officer, Cohoes. Ordered examined April 24. Analyzed and reported upon May 5, as follows:

ALBANY, *May* 5, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I enclose herewith reports in duplicate on the analyses of four samples of water received by your order on April 24, 1902, from Dr. John Archibold, health officer, Cohoes, N. Y. No description of these samples accompanied them, but I am informed that they are river water from the intake pipe and reservoirs supplying the city of Cohoes. The samples present no very striking differences. In general appearance they are all fairly good for surface water and they are all free from decided or objectionable odor. The ammonias are highest in No. 3, but compare favorably with the averages found in Mohawk and Hudson river water and most American river waters. The same may be said of the nitrogen in nitrates. Nitrogen in nitrates, indicative of comparatively recent sewage pollution, is highest in the sample from the intake and in No. 1, and decidedly lower in No. 3 and No. 4. The water of the Hudson in this vicinity sometimes shows no nitrites, but has frequently yielded higher results than do these waters. In surface waters the presence of nitrites in appreciable quantities is an almost positive indication of recent sewage pollution, and, although many cities may be supplied with water thus contaminated, such water can never be favorably regarded.

The total solids are comparatively lower, and satisfactorily so, in all the samples. The loss on ignition is fairly high in each case and the residue obtained upon evaporation blackened on ignition in each instance.

These waters cannot be considered as of very satisfactory quality, but they cannot be condemned from the chemical standpoint as showing evidence of gross and unusual pollution. But the fact must not be lost sight of that no chemical analysis can distinguish specifically harmful contamination, and it is very doubtful if any kind of examination can do so with certainty in such a case. And it should be borne in mind that the waters of rivers which receive the sewage of towns are in most cases unsatisfactory and unfit for city supply and that they furnish the chief source of communication for certain water-borne diseases, and that, therefore, any water which shows evidence of distinct sewage pollution is unsafe for public use as a source of supply, even if it be impossible to demonstrate the presence of specific disease germs in such water.

Very respectfully yours

WILLIS G. TUCKER
Director

April 26. Received sample of powdered ginger from Dr. J. F. Fitzgerald, superintendent Rome custodial asylum. Examined and reported upon as follows:

ALBANY, *June* 2, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—On April 26 I received from you a package described as containing "a sample of ginger received from John F. Fitzgerald, M. D., superintendent Rome custodial asylum," of which you directed me to make an examination. Powdered ginger is not infrequently adulterated, such substances as wheat, corn and rice flour, turmeric, cayenne, sawdust, mustard hulls and other adulterants and make-weights being frequently mixed with it as sold. Unfortunately the results obtained on chemical analysis in the case of this spice are generally unsatisfactory, since from determinations of alcohol and ether extracts, albuminoids, starch and ash, no very reliable indications can be drawn. A microscopical examination is more helpful and generally more satisfactory, although the positive identification of foreign matters is frequently difficult and sometimes impossible.

The general appearance, odor and taste of this sample are fairly good, but a microscopical examination and comparison with samples of powdered African and Jamaica ginger of known purity shows the presence of foreign matter, including portions of the hulls or husks of foreign seeds, resembling mustard hulls in their structure and certainly foreign to ginger, and other foreign matter not positively identified, including matter closely resembling turmeric. Although of better quality than a good deal of the powdered ginger which is sold in the stores, this sample is by no means pure, and, while not grossly sophisticated, it must be classed with adulterated articles, in that it contains matter foreign to pure ginger.

Very respectfully yours

WILLIS G. TUCKER
Director

May 1. Received sample of water from Mr. William Dillon, secretary of the board of health, Wellsville. Ordered examined May 1. Analyzed and reported upon May 8.

May 1. Received sample of water from Dr. G. C. Morey, health officer, Remsen. Ordered examined May 2. Analyzed and reported upon May 8.

May 2. Received from office of Department a list of dealers in Albany and Rensselaer alleged to be selling an inferior and illegal quality of kerosene oil, with instructions to collect samples from them and examine and report upon the same.

May 2. Received from office of the Department a communication from a complainant in New York city relating to certain cereal coffees, with instructions to collect samples and report upon the same. Samples were obtained and subsequently report made upon their examination as follows:

ALBANY, *June* 19, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—Referring to your communication of May 2, 1902, directing me to procure and examine certain samples of cereal coffees, so-called, and enclosing a copy of a letter from Mrs. Walter Mathesen, of No. 32 West Sixty-sixth street, New York, referring to the same, I would respectfully report as follows upon each of the three articles specified:

(1) "Minute Malted Cereal Coffee," manufactured by the Whitman grocery company, Orange, Mass.

This article was not known by the wholesale grocers of Albany nor found on sale at retail in the stores. I obtained a sample through Weidman & Co., wholesale grocers of this city, who procured it for me from Boston. Weight of package was 1 pound 3 ounces. Price not stated. Printed matter on the package describes it as a substitute for coffee and a "genuine pure food drink." It is stated to be the "result of carefully selected grains, roasted and blended," and to be "free from all those qualities which make coffee injurious."

On examination I find it to consist of roasted and quite finely ground cereals, hulls and other vegetable matter not readily identified. The starchy and nitrogenous matter which it contains gives it a certain food value, although in the quantities in which it would ordinarily be consumed such value is not large.

When prepared as directed, however, with the addition of sugar and cream, it has some dietetic value; is probably agreeable to some tastes and is unobjectionable from the sanitary standpoint.

(2) "Old Grist Mill Entire Wheat Coffee," Potter & Wrightington, agents, Boston, Mass.

This article is well-known and largely sold in this vicinity. A sample was purchased from F. T. Snyder, 99 Hudson avenue, Albany. Weight of same, 1 pound 1¼ ounces. Price, 20 cents. The printed matter on the package describes it as "The best substitute for coffee," and states that it is "a perfect hygienic product, containing the entire wheat kernel roasted and ground. * * * It is, in every sense, a pure health food."

On examination I find it to consist of roasted cereals, apparently chiefly, if not entirely, wheat, together with ground browned peas and some real coffee. Prepared as directed and drunk with milk or cream and sugar it is probably a palatable, and is certainly an unobjectionable, beverage. That it contains no coffee is, perhaps, implied, but is not directly stated on the package, and, aside from this fact, I do not think that it can be said that the claims made concerning it are harmfully misleading.

(3) "Kneipp Malt Coffee," Lust's hygienic baking company, 832 Eighth avenue, New York.

This article was not found on sale in Albany, but I obtained a sample through Weidman & Co., who procured it from the makers. Its advertised price is 15 cents per pound, or 4 pounds for 50 cents. It consists of whole roasted grain, evidently barley, as claimed. It is a clean and entirely unobjectionable article, making no pretense to being or containing coffee.

In my opinion none of these articles are in any way objectionable nor do they seem to violate any provision of law. Possibly some extremists might object to the use of the term coffee in connection with substances of this class, but it seems to me that articles denominated "Cereal coffee," "Wheat coffee" or "Malt coffee" are neither intended to deceive, nor likely to mislead anybody, and that a term such as malt coffee is as legitimate as beef tea or ginger ale. In each of these instances the qualifying term is printed in type as large as the word coffee, and it is evident that this word is used as meaning nothing more than a substance intended to be made into a drink and used to accompany food. I see no reason why the sale of such articles should be restricted or interfered with. They are fairly low-priced; certainly harmless, and clearly sold entirely on their merits.

Very respectfully yours

WILLIS G. TUCKER

Director

May 3. Received from office of the Department a further list of dealers alleged to be selling kerosene oil of inferior quality, with instructions as to collection of samples from same.

May 6. Received from office of Department a sample of kerosene oil from a package sold to St. Agnes cemetery, with instructions to test same. Sample was examined and reported upon May 29.

May 8. Received sample of water from Dr. J. A. Reed, health officer, Newburgh. Ordered examined May 9. Analyzed and reported upon May 13.

May 8. Mr. T. J. Bradley purchased, under my instructions, 12 samples of kerosene oil from retailers in Albany.

May 9. Mr. A. S. Morrill purchased, under my instructions, two samples of kerosene oil in Albany for examination.

May 9. Mr. T. J. Bradley purchased one sample of kerosene oil in Rensselaer.

May 10. Mr. T. J. Bradley purchased 12 samples of kerosene oil in Albany.

May 10. Mr. T. J. Bradley purchased in Albany a sample of "Old Grist Mill Entire Wheat Coffee" for examination, as ordered, May 2.

May 15. Procured in Albany samples of "Minute Malted Cereal Coffee" and Kneipp's "Malt Coffee" for examination, as ordered May 2.

May 17. Received from office of the Department a communication made to the governor relating to the alleged use of wood alcohol in the manufacture of extracts, with instructions to investigate and report upon the matter. Visited Glens Falls on June 11 and subsequently reported on investigation as follows:

ALBANY, *June* 13, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—In conformity with your instructions of May 16 I visited Glens Falls June 11-12 and investigated the matter of the complaint made to the governor by a resident of Glens Falls, who alleges, in a communication addressed to Governor Odell and dated May 11, 1902, that the Hudson valley preserving company in that place are employing wood alcohol, which he refers to elsewhere in his communication as "Coal tar poison" and "Coal tar spirits" in the manufacture of extracts for family use, and also alleging that six drug stores in the town are "all using coal tar spirits," and he refers to these firms as "sending poisoned goods all over the land."

In a communication dated May 19 I called attention to the fact that "the statements contained in the complaint are not only vague, confused and intemperate, but incorrect, as well," and that, while making a general and sweeping charge, the complainant furnishes no proof of "a gross violation of the Pure food law of the state" to which he refers.

On consultation with several influential citizens of Glens Falls, including a physician of prominence, the postmaster and deputy postmaster, and the agent of the National express company, I found that a resident of the village has been engaged in the manufacture and sale of mince meat, baking powder, extracts and other articles, at various times and in various places in Glens Falls, but that no such company as is named by the complainant is generally known to the public nor is it named in the directory. I was informed on what appeared to be good authority that the complainant has been engaged in various occupations and is the father of the manufacturer referred to. He is an elderly man, regarded as eccentric, and he does not appear to be generally regarded as one whose statements in such a matter are entitled to serious consideration. I am not of opinion that his complaint is based upon real facts nor that it is made in good faith. No such company as that which he names appears to be engaged in the manufacture of extracts upon any considerable scale, if, indeed, any such company at all is engaged in any such business at the present time, and on investigation I can find nothing to warrant his statement concerning the improper use of wood alcohol or any other body of like nature by the druggists of Glens Falls, nor do I believe that any such abuse exists. I deemed it unnecessary, therefore, to collect any samples for examination, and would recommend that the complaint be dismissed and on the ground that the charges made are not founded on fact.

Very respectfully yours

WILLIS G. TUCKER
Director

May 20. Received sample of water from Dr. N. Fanning, health officer, Catskill. Ordered examined May 20. Analyzed and reported upon May 22.

May 20. Procured sample of kerosene oil from peddler selling from wagon in front of No. 18 Lancaster street, Albany.

May 20. Made preliminary report upon examination of 29 samples of kerosene oil to date, as follows:

ALBANY, *May* 20, 1903

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—Referring to your instructions contained in communications of May 1 and May 2 relating to the collection and examination of certain samples of kerosene oil, I would say that samples were procured from most of the dealers named in your communication of May 1, and that these have been examined in the method prescribed by law. In all 29 samples have been received and examined, and detailed reports upon each of these samples will be forwarded later when proper blanks for this purpose have been provided. But I deem it proper to report at this time that of these 29 samples only three were of the quality required by law. The other samples varied in flashing point from 75 degrees to 93 degrees. All of these samples were obtained in Albany, with the exception of a single sample procured in Rensselaer.

Very respectfully yours

WILLIS G. TUCKER
Director

May 20. Received from office of the Department eight samples of kerosene oil collected in Newburgh and other places by an agent of the Department for examination.

May 22. Received from the office of the Department a sample of kerosene oil from a package purchased by and for the use of St. Agnes cemetery, with instruction to test the same.

May 22. Made preliminary report on the examination of nine samples of kerosene oil received May 20 and 22, stating that three of the samples had a flashing point below 100 degrees, and that the remaining samples had flashing points varying from 102 to 108 degrees.

May 28. Received sample of water from Dr. E. B. Belknap, health officer, Wyoming. Ordered examined June 2. Analyzed and reported upon June 6.

May 29. Made full report upon the examination of 38 samples of kerosene oil, to date, as follows:

ALBANY, *May* 29, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I transmit herewith separate reports in duplicate on the examination of all samples of illuminating (kerosene) oil received from you, or purchased for me for purpose of examination, under instructions received from you. The samples are numbered from 8720 to 8757, both inclusive, and the reports state date of receipt of sample, source of same, by whom purchased, of whom purchased or procured, date of purchase or procuring of sample, and flashing point of the oil when tested in the instrument and by the method prescribed by law.

The 38 samples now reported upon were purchased or procured between April 9 and May 21, 1902. There were received from the office of the Department and obtained in Albany, two samples; from the office of the Department and purchased by Mr. F. D. Beagle in Milton, one sample; Newburgh, two samples; Firthcliff, one sample; Highland Falls, one sample; Hudson, one sample, and Chatham, two samples; purchased in Albany, under my direction, by Mr. T. J. Bradley, 24 samples, and in Rensselaer by him, one sample; and purchased or procured for me by others in Albany, three samples. In flashing point the samples showed a wide variation, the extremes being 75 degrees and 108 degrees Fah. Full particulars concerning the samples will be found in the accompanying reports.

Very respectfully yours

WILLIS G. TUCKER
Director

NOTE.—A tabulated statement giving results of the examinations of these samples of oil and of other samples examined during the year will be found appended to this report.

June 5. Purchased from Hisgen Brothers, Albany, three samples of kerosene oil. Examined same and reported upon them as follows:

ALBANY, *June* 6, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—In conformity with your suggestion I visited the works of Hisgen Brothers on Tivoli street, this city, yesterday, June 5, in the forenoon, in company with Mr. A. S. Merrill, and procured three samples of kerosene oil for examination. In company with one of the Messrs. Hisgen we visited the detached building in which oil is pumped from cars standing on a siding near at hand into tanks, from which, as I was informed, the wagons used in delivering oil to customers are filled. In this place it would appear that barrels are also filled from the tanks, as the room contains a large number of oil barrels of various colors. The ends of three large cylindrical closed tanks projected into this building, the larger part of the tanks lying outside of the building. I was informed that the first tank or one nearest to the pumps contained "Headlight oil," called 150 degree test, and was an ordinary grade of kerosene. I was informed that the second, or middle, tank contained "Crystalline oil," called 175 degree test, being a better and higher-priced oil, corresponding to "Astral oil" in trade, and that the third tank, or that one furthest from the pumps, contained gasoline. There were two pumps, and I was informed that one of these was used in pumping kerosene only and connected with tank 1 and tank 2, and that the other pump, connected with tank 3, was used for pumping gasoline, and that there was no communication between the first two tanks and the third tank.

Samples of oil from tanks 1 and 2 were taken directly from the tanks in quart bottles, which bottles were properly marked for purpose of identification. A third sample of "Puritan oil," called 175 degree test, represented to be of same quality as that in tank 2, or "Crystalline oil," but colored red, was also taken from a barrel opened in my presence and properly marked. Mr. Hisgen informed me that these were the only kinds of kerosene on sale by them, although they dealt in other petroleum products.

These samples were permanently labeled subsequently and given the serial numbers 8758, 8759 and 8760, respectively. I have tested these samples and find the flashing point of the same to be as follows:

	Serial number	Designation	Flashing point
No. 1	8758	Headlight oil	85 degrees F
No. 2	8759	Crystalline oil	104 degrees F.
No. 3	8760	Puritan oil	104 degrees F.

Separate reports in duplicate on these samples are enclosed herewith.

I would advise that Messrs. Hisgen Brothers be promptly notified of the results of these tests, as they desire to receive this information and expressed a desire to comply with the provisions of law bearing upon the matter.

Very respectfully yours

WILLIS G. TUCKER
Director

June 7. Received sample of water from Dr. C. L. Fletcher, health officer, South Dover. Ordered examined June 10. Analyzed and reported upon June 13.

June 7. Received from officer of Department a sample of mustard and horseradish for examination sent by Dr. T. E. Bullard, health officer, Schuylerville. Examined same and reported as follows:

ALBANY, *June* 19, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—On the 7th instant I received from you a sample of mustard and horseradish which had been sent to the Department by Dr. T. E. Bullard, health officer of Schuylerville, N. Y., together with a copy of a letter from Dr. Bullard, dated May 24, 1902, relating to the same. This letter stated that "about a month ago" a family had been "poisoned with something," and that the mustard was suspected to be the cause of the illness.

The mustard was contained in a glass jar, with a tin cap, labeled "Gulden's Mustard with Horseradish" * * * "Prepared by Charles Gulden, N. Y." A defaced and partially destroyed label on the neck named "mustard seed, vinegar and spices" as among its constituents. It had a pasty consistence and a brownish-yellow color and an odor resembling that of the common prepared mustard known as French or German mustard.

I have examined the sample with care and find it to be free from salicylic acid or other objectionable preservative agent, nor do I find it to contain Martius yellow, frequently used to color mustards, or any other harmful coloring matter. Since arsenic, antimony or some other poisonous metallic compounds might have been intentionally added, or accidentally present, these were also looked for, but no trace of any such poisons were detected. There remained the possiblity of the presence of some ptomain or bacterial poison, but I deemed the probability of any such being present in an article of this kind as altogether too remote to warrant a further and elaborate investigation for poisons of this class.

In my opinion the examination made is amply sufficient to establish the absence of poisonous or harmful constituents in the article submitted for analysis.

Very respectfully yours

WILLIS G. TUCKER
Director

June 12. Received from office of Department a sample of kerosene oil described as "Hisgen oil, purchased from George C. Layman, Franklin street, Kingston, N. Y." Examined same and found it to have a flashing point of 79 degrees Fah. Reported on same June 13.

June 14. Visited Catskill and made an inspection of the reservoir supplying the village with water, and of the pumping station and took samples of water for analysis. Reported on same as follows:

ALBANY, *June* 21, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I respectfully enclose herewith reports in duplicate on the analyses of three samples of water taken by myself in the village of Catskill on June 14, as directed by you and referred to in my communication of June 16. These samples probably fairly represent the present condition of the public water supply. They were taken by me after consultation with, and in presence of, Mr. T. B. Beach, member of the board of water commissioners; Mr. A. M. Murphy, attorney to the board, and Mr. W. D. Coons.

Sample No. 660 was taken from the reservoir near the outlet gate-house. This reservoir is said to have a capacity of some four or five million gallons, and its sloping sides are of rubble masonry. The water was fairly clear, but in mass had a brownish tint. It receives its supply through a ten-inch force main through which the water is pumped from the river without opportunity for sedimentation or filtration, and its elevation above tide is something under 300 feet. Its depth is over 20 feet and the outlet is a 12-inch pipe, the opening into which is several feet above the bottom, so that some opportunity exists for sedimentation in the reservoir, the side and bottom of which are undoubtedly thickly covered with mud. I am informed that it has not been cleaned for a long time nor does there seem to be any method by which, under existing conditions, it can be cleaned, since its storage capacity is taxed to the utmost to supply the village, and, as there is no dividing wall, nor any exit pipe at the bottom, in order to clean it it would be necessary to empty it to the level of the outlet pipe and siphon or pump out the residual contents, which would entail cutting off the village supply while the work was being carried on. It might, indeed, be possible to connect the force main with the delivery main while the reservoir was being emptied and cleaned, but since the capacity of the pumps and main is less than the average daily consumption, during the summer months at least, the level of the water in the reservoir, falling each day and the pumps being operated day and night in order to maintain the supply, it is doubtful whether an amount adequate to the needs of the village could thus be provided.

Sample No. 661 was taken from the pump well at the pumping station on the river front. The intake pipe extends a short distance into the river, and it is the belief of some that springs exist at the bottom of the river in this vicinity, but if such be the case I doubt if it has any important effect upon the quality of the water as pumped. In the pump well the water passes through a wire screen to remove the coarser floating and suspended matter, and the sample was taken from inside this screen and as it is lifted by the pumps. There are two pumps, one being usually operated at a time and the other kept in reserve, and each has a capacity of about 950,000 gallons a day. But the main leaks, as we observed, at many places, so that the ground over the main is saturated with water at many points, and I was informed that there were many leaks in the reservoir also, so that, perhaps, a third of the water raised goes to waste.

Sample No. 662 was taken from a tap over a sink in Welch's shoe store, No. 371 Main street. The appearance of this sample and the analytical results was in some respects peculiar and it is possible that it does not fairly represent the quality of the water supplies to the village generally. The water was allowed to run for a time before taking the sample, but the connecting pipe or main supplying it may not be frequently flushed, so that a deposit may form in it at times and possibly such deposit was contained in the pipe or main at time this sample was taken. At all events it differs materially from and is in some respects decidedly inferior to the other samples.

As regards the physical properties of these waters it may be said that aside from the last-named sample they are fairly satisfactory as regards color, general appearance and odor. From the chemical standpoint the analytical results are by no means entirely satisfactory. Chlorine is the same and quite low in all; free ammonias rather high, and in the case of the sample from the pumping station, very high; albuminoid ammonias not exessive; nitrites distinctly present, but not excessively high in he samples from the reservoir and pumping station, and absent n the third sample; nitrogen in nitrates low; total solids low, ut much higher in the sample from Welch's store than in the ther samples. In some respects these results are quite different rom those obtained on the analysis of a sample of water reeived from the health officer of Catskill in May and they are in nost respects much better, but they cannot be considered as ntirely satisfactory. The previous sample contained no less than 7.40 parts of total solids, and the albuminoid ammonia and itrogen in nitrates was much higher than in any of these three amples, while its general appearance was distinctly inferior. This previous sample was described as having been taken from the reservoir, and I am at a loss to account for these results which would not appear to be easily explained.

In my opinion the reservoir should be cleaned and means provided in the near future which will admit of this work being done without interruption to the supply. But while such a course is certainly to be advised, I do not think that the present condition is one which need create alarm. The vital statistics show no evidence at all of any unusual outbreak of disease, nor indeed of any particular disease which can be fairly attributed to the water supply. Indeed, the death rate of the past eight months, which I have examined, is at the rate of 17 per thousand per annum, while for the entire state it is 19.1 per thousand, and there have been during this period but four deaths from zymotic diseases and only one death from typhoid fever reported. Nevertheless the condition of the water in the reservoir, which must of necessity vary with the conditions existing in the river and is probably worse at certain seasons than at the present time, might be greatly improved by proper sedimentation, even if filtration be not resorted to for the present. With a larger reservoir there would be no need of pumping when the water in the river is in an unsatisfactory condition, as during freshets, and if the reservoir were provided with a dividing wall one-half could be cleaned when necessary without interruption to the supply. I do not regard the present conditions as alarming, nor are they probably unusual, but in my opinion steps ought to be taken without unnecessary delay for increasing the supply and improving the quality. It is easy to see that conditions may at any time occur under which the reservoir water may become of a quality so unsatisfactory as to be quite unfit for use, and should any accident happen to the pumping machinery, or serious break occur in the force main, the village would be left without a supply of water, and health, life and property perhaps imperiled. At the least in any such event much inconvenience and loss would certainly result.

Proper steps ought therefore to be taken by the village as a matter of public policy to improve the quality and add to the quantity of the water supply.

Very respectfully yours

WILLIS G. TUCKER

Director

(The analyses will be found with other water analyses at the end of this report.)

June 26. Received sample of water from Dr. F. H. Green, health officer, Homer. Ordered examined June 26. Analyzed and reported upon June 28.

June 26. Received from office of Department a sample of pork sent by Mr. F. J. Grimm, Constableville, of which an examination was directed. Examined and reported upon same as follows:

ALBANY, *June* 27, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—In conformity with your instructions I have examined the sample of pork received yesterday, which had been sent by Mr. Frank J. Grimm, of Constableville, N. Y., who states that it "apparently looks healthy, but as soon as it is heated there arises a very strong and disagreeable odor," and he desires to be informed as to "its fitness for food."

The pork is evidently pig pork, which has not been long in salt or brine. It is part lean and part fat; has a good color and appearance, and is free from any disagreeable odor, or musty odor, or anything to indicate taint. I have submitted it to three butchers and dealers in meats and they consider it of good quality and in good condition, agreeing with me in this opinion. On boiling portions of the pork in water no unusual nor unpleasant odor was evolved even after long boiling. There having been no indication that the pork had caused illness, no examination for poisons which might have been accidentally present or intentionally added was deemed necessary, and for the same reason no examination for trichinae was made. Such meats if improperly kept will of course decay, but in my opinion this pork, in its present condition, is entirely fit for use as food.

Very respectfully yours

WILLIS G. TUCKER

Director

July 10. Received two samples of water from Dr. J. A. Reed, health officer, Newark. Ordered examined July 12. Analyzed and reported upon July 15.

July 18. Received two samples of water from Dr. S. Demarest, health officer, Suffern. Ordered examined July 17. Analyzed and reported upon July 22.

July 31. Received sample of water from Dr. J. L. Hanmer, health officer, Middletown. Ordered examined August 1. Analyzed and reported upon August 4.

August 8. Received sample of water from Dr. H. E. Cooley, health officer, Angelica. Ordered examined August 9. Analyzed and reported upon August 13.

August 11. Received sample of water from the board of health of the village of Gouverneur, sent by Dr. C. McCarty. Ordered examined August 12. Analyzed and reported upon August 13.

August 12. Received sample of water from Dr. G. F. Regan, health officer, Medina. Ordered examined August 16. Analyzed and reported upon August 19.

August 15. Received from office of Department four samples of sewage from sewage disposal plant at Liberty, sent by Prof. O. H. Landreth. Ordered examined August 16. Analyzed and reported upon September 13, as follows:

ANALYSIS OF SEWAGE—NO. 1.

(Results are parts in 100,000.)

Received from State Department of Health; date received, August 15, 1902; source, sewage disposal plant, Liberty, N. Y.; how labeled, "No. 1." Appearance: Turbid, some light-colored sediment and more than in other samples. Odor, highly offensive; chlorine, 2.20; free ammonia, 0.9925; albuminoid ammonia, 0.1350; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 42.40; loss on ignition, 29.20; behavior during ignition, blackened and colored, foul odor; mineral matter, 13.20; oxygen consumed, 3.8460.

Bureau of chemistry, September 13, 1902.

ANALYSIS OF SEWAGE—NO. 2.

(Results are parts in 100,000)

Received from State Department of Health; date received, August 15, 1902; source, sewage disposal plant, Liberty, N. Y.; how labeled, "No. 2." Appearance: Turbid, slight; light-colored sediment. Odor, highly offensive; chlorine, 5.20; free ammonia, 1.5250; albuminoid ammonia, 0.2550; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 30.40; loss on ignition, 14.20; behavior during ignition, blackened and colored, foul odor; mineral matter, 16.20; oxygen consumed, 5.0860.

Bureau of chemistry, September 13, 1902.

ANALYSIS OF SEWAGE—NO. 3.

(Results are parts in 100,000)

Received from State Department of Health; date received, August 15, 1902; source, sewage disposal plant, Liberty, N. Y.; how labeled, "No. 3." Appearance: Slightly turbid; slightly dark-colored sediment. Odor, cold, slight; hot, urinous; chlorine, 4.70; free ammonia, 1.5100; albuminoid ammonia, 0.1100; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 22.40; loss on ignition, 10.20; behavior during ignition, blackened, some odor; mineral matter, 12.20; oxygen consumed, 1.5060.

Bureau of chemistry, September 13, 1902.

ANALYSIS OF SEWAGE—NO. 4.

(Results are parts in 100,000)

Received from State Department of Health; date received, August 15, 1902; source, sewage disposal plant, Liberty, N. Y.; how labeled, "No. 4." Appearance: Slightly turbid; slight dark-colored sediment. Odor, cold, none; hot, very slight; chlorine, 4.90; free ammonia, 0.9350; albuminoid ammonia, 0.1100; nitrogen as nitrites, 0.0430; nitrogen as nitrates, 0.0000; total solids, 19.40; loss on ignition, 5.60; behavior during ignition, blackened, slight odor; mineral matter, 13.80; oxygen consumed, 2.5460.

Bureau of chemistry, September 13, 1902.

18. Received by express from Sag Harbor 12 samples articles purchased by Charles E. Thompson in Sag r examination, as follows:

tartar	1 sample
	2 samples
omatoes	1 sample
atsup	2 samples
	2 samples
xtract	2 samples
	1 sample
	1 sample

19. Received two samples of water from Dr. R. A. health officer, Liverpool. Ordered examined August 19. and reported upon August 21.

20. Received by express from Greenport 12 samples of les purchased by Charles E. Thompson for examination :

	1 sample
	2 samples
atsup	2 samples
tartar	1 sample
xtract	2 samples
	2 samples
	1 sample
matoes	1 sample

21. Received by express from Riverhead 10 sam- ood articles purchased by Charles E. Thompson for ion as follows:

	2 samples
atsup	2 samples
xtract	1 sample
	1 sample
tartar	1 sample
matoes	1 sample
	1 sample
	1 sample

August 22. Received by express from Hempstead 11 samples of food articles purchased by Charles E. Thompson for examination as follows:

Coffee	2 samples
Vanilla extract	2 samples
Chocolate	2 samples
Canned tomatoes	1 sample
Tomato catsup	1 sample
Mustard	1 sample
Cocoa	1 sample
Cream of tartar	1 sample

August 27, 28, 29. Received by express nine samples of kerosene oil for examination, collected by Mr. C. E. Thompson in Poughkeepsie, Newburgh, Kingston and Castleton, August 26 and 27. Examined and reported on same as follows:

ALBANY, *September* 19, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—I respectfully transmit herewith reports in duplicate on the examination of nine (9) samples of kerosene oil received by your order on August 27, 28 and 29, 1902, and collected by Mr. Charles E. Thompson, in Poughkeepsie, Newburgh, Kingston and Castleton on August 26 and 27. The samples are numbered from 8762 to 8770, both inclusive, and the reports state date of receipt of sample, source of same, by whom purchased, of whom purchased, date of purchase, and flashing point of the oil when tested in the instrument, and by the method prescribed by law.

The samples now reported upon are all of good quality and above the legal requirement as to flashing point, which varies from 102 to 108 degrees in the different samples.

Very respectfully yours

WILLIS G. TUCKER
Director

(A tabulated statement of results of examination of all samples of kerosene oil will be found appended to this report.)

September 2. Received from office of State Department of Health 24 samples of food articles collected in Utica and other places by Mr. G. G. Champlin for examination as follows:

Coffee	3 samples
Canned tomatoes	1 sample
Lager beer	2 samples
Tomato catsup	2 samples
Vanilla extract	2 samples
Cream of tartar	3 samples
Mustard	2 samples
Cocoa	1 sample
Whiskey	8 samples

September 13. Received sample of water from Dr. E. M. Austin, Tupper lake, marked "Reservoir water." Ordered examined September 15. Analyzed and reported upon September 19.

September 16. Received sample of water from Dr. S. A. Wessels, health officer, Canajoharie. Ordered examined September 17. Analyzed and reported upon September 19.

October 15. Received sample of water from Dr. F. H. Green, health officer, Homer. Ordered examined October 15. Analyzed and reported upon October 18.

November 26. Received from office of Department a sample of kerosene oil "used in baggage cars of N. Y., N. H. & H. R. R.," and sent for examination by state railroad commission. Subsequently examined and reported upon December 16. Igniting point, 295 degrees Fahr.

Received six samples of water from Niagara Falls, sent by Prof. O. H. Landreth, C. E. Ordered examined December 11. Analyzed and reported upon December 22.

December 4. Received sample of water from Mr. F. L. Moran, secretary board of health, Watkins. Ordered examined December 13. Analyzed and reported upon December 26.

December 5. Received sample of water from Dr. J. H. Bogart, health officer, North Hempstead, Roslyn, N. Y. Ordered examined same day. Analyzed and reported upon December 13.

December 9. Received two samples of water from Dr. E. R. Osterhout, health officer, Trumansburg. Ordered examined same day. Analyzed and reported upon December 17.

December 9. Received from office of Department two samples of cocoa preparations concerning which complaint had been made, with instructions to examine same. Examined and reported upon as follows:

ALBANY, *December* 29, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—On the 9th inst. I received from you a sample of "Sterry's cocoa," and one of "Malt Creamlet cocoa," together with a copy of a communication from a manufacturer of cocoa in Boston, who had sent them to you, complaining that "the Sterry cocoa is composed wholly of cocoa-shells," and that "the Malt Creamlet cocoa contains very little, if any, cocoa, but is composed, I think, largely of glucose." In conformity with your instructions I have made an examination of these samples and would respectfully report as follows:

The Sterry cocoa is referred to by the complainant as "shelled" cocoa, but it is not so designated upon the package, the label upon which reads, "Sterry's Pure Powdered (Shell) Cocoa." The word "shell" is printed in small type, and in such a manner as to attract little attention, but the article is not called "shelled," which would of course imply that the shells had been removed. The price printed upon the package is five cents for a quarter of a pound, which is of course considerably below the ordinary retail price of a first class article. No intelligent purchaser certainly would expect to obtain a high-grade cocoa at such a price.

On examination I find it to be composed largely of finely pulverized cocoa-shells, but it contains some real cocoa-starch and some fat, and its odor and taste are those of cocoa. I find in it no adulterants aside from the shells, and these have long been openly sold in the stores for use in making a beverage, and are by no means without value. It is certainly a low grade article, but it is sold at a low price, and as it has some food value and contains no harmful adulterant I am of opinion that it would not be advisable at the present time to interfere with its sale.

The "Malt Creamlet cocoa" is put up in a cake weighing one-quarter of a pound and divisible into ten squares, one of which is directed to be dissolved in a cup of hot milk or milk and water. The printed matter upon and within the package states that the

rch of the cocoa has been converted into invert sugar by the
lt-diastase which has been used in its preparation, and that it
tains all the fat of the cocoa-bean.
n examination I find it to contain reducing sugar as claimed;
be practically free from starch as stated, and to contain con-
erable fat. It is described by the makers as a compounded
icle and does not profess to be a pure cocoa, and its name also
rly indicates that this is the case. Indeed it would be hard
define pure cocoa, since all the cocoas, bromas and chocolates
n the market are, in a greater or less degree, compounded.
en prepared as directed this article yields a palatable and
olesome beverage, and if people desire to purchase an article
this class I can see no reason why they should not be allowed
lo so.

Very respectfully yours

WILLIS G. TUCKER
Director

ecember 20. Received sample of water from Mr. F. H. Green,

etary board of health, McGraw. Ordered examined Decem-
23. Analyzed and reported upon December 30.

WATER ANALYSES

uring the year 52 samples of water used for domestic pur-
es were received, analyzed and reported upon as above stated.
examination has included physical properties (color, tur-
ity, sediment and odor); chlorine, free and albuminoid am-
ias; nitrogen in nitrites, and in nitrates; total solids; loss
ignition and behavior; mineral matter, and other special de-
ninations, if deemed necessary in particular cases. The results
ined have been deemed sufficient for determining fitness for
estic use in most instances. To all senders of samples the
owing printed instructions have been sent in advance, and in
struing the results of the examination the information which
been furnished concerning source of sample, its surroundings
possible contaminations, has been given due weight in form-
an opinion as to fitness for use, and this fact will explain why
e waters have been condemned which, judged solely by the
lytical results, might appear to be of fairly satisfactory
lity.

NEW YORK

STATE DEPARTMENT OF HEALTH

ALBANY

CHEMICAL ANALYSIS OF WATER

DIRECTIONS FOR TAKING AND FORWARDING SAMPLES OF WATER.

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1. Use clean *glass* demijohns of gallon capacity. *Never use stone jugs.*

2. Rinse the demijohns thoroughly several times with the water before filling.

3. Fill with a fair sample of the water to be analysed, and if dippers, funnels or other vessels are used, see to it that these are clean.

4. Close with a *new and clean cork* which should be well tied down with cord. The ends of the cord may be sealed, but top should not be coated with wax.

5. Accompany the sample with description of same, stating source, proximity of houses, stables, privies, cesspools, drains or other sources of possible contamination, and if from well, depth, and character of soil. If several samples are sent state whether from same vicinity or same source, and describe fully, stating reasons for selection of the samples. All samples to be properly numbered or otherwise labeled for purpose of identification.

6. Forward without delay, *prepaying all charges*, to Prof. Willis G. Tucker, Director, Bureau of Chemistry, Albany Medical College, Albany, N. Y.

7. Make the addressed Tag or Marking secure.

The reports not having been elsewhere published are appended:

No. 636

(Results are parts in 100,000)

Received from G. C. Mills, assistant engineer Plattsburg improvement commission; date received, January 13, 1902; source, Lake Champlain; how labeled, "No. 1." Appearance: Color, greenish-yellow tint; turbidity, very slight; sediment, trifling. Odor at 100 degrees F., very slight; chlorine in chlorides, 0.15; free ammonia, 0.0020; albuminoid ammonia, 0.0110; nitrites, 0.0000; nitrates, 0.0272; oxygen consumed, 0.7015; total solids, 7.80; loss on ignition, 4.40; behavior during ignition, blackened; mineral matter, 3.40; remarks, results indicate vegetable rather than animal or sewage pollution.

Dated at State Board of Health laboratory, Albany, N. Y., January 21, 1902.

No. 637

(Results are parts in 100,000)

from G. C. Mills, assistant engineer Plattsburg im- commission; date received, January 13, 1902; source, uplain; how labeled, "No. 2." Appearance: Color, llow tint; turbidity, very slight; sediment, slight. 0 degrees F., very slight; chlorine in chlorides, 0.15; nia, 0.0040; albuminoid ammonia, 0.0135; nitrites, rates, 0.0296; oxygen consumed, 0.7415; total solids, n ignition, 4.20; behavior during ignition, blackened; tter, 2.40; remarks, results indicate vegetable rather l or sewage pollution.

t State Board of Health laboratory, Albany, N. Y.,
, 1902.

No. 638

(Results are parts in 100,000)

from Dr. J. L. Hanmer, health officer, Middle- received, January 22, 1902; source, well; how labeled, avenue, No. 99." Appearance: Color, light greenish lity, none; sediment, very slight. Odor at 100 degrees chlorine in chlorides, 1.10; free ammonia, 0.0013; al- ammonia, 0.0070; nitrites, 0.0010; nitrates, 1.5360; s, 33.20; loss on ignition, 10.80; behavior during ig- tened slightly; mineral matter, 22.40; remarks, advised nue present use under circumstances as stated.

t State Board of Health laboratory, Albany, N. Y.,
, 1902.

No. 639

(Results are parts in 100,000)

from Dr. F. W. Robertson, superintendent State re- Elmira; date received, January 29, 1902; source, fil- voir water; how labeled, "State Reformatory, Elmira." e: Color, greenish tint; turbidity, whitish opacity;

sediment, decided. Odor at 100 degrees F., very slight; chlorine in chlorides, 0.20; free ammonia, 0.0085; albuminoid ammonia, 0.0120; nitrites, 0.0034; nitrates, 0.0908; total solids, 7.80; loss on ignition, 2.60; behavior during ignition, blackened; mineral matter, 5.20; remarks, not very satisfactory.

Dated at State Board of Health laboratory, Albany, N. Y., February 6, 1902.

No. 640

(Results are parts in 100,000)

Received from Dr. J. L. Hanmer, health officer, Middletown; date received, February 6, 1902; source, well; how labeled, "Well water, 139 North street." Appearance: Color, light greenish tint; turbidity, very slight; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 3.70; free ammonia, 0.0255; albuminoid ammonia, 0.0220; nitrites, trace; nitrates, 0.2760; total solids, 55.80; loss on ignition, 14.20; behavior during ignition, blackened, some odor; mineral matter, 41.60; remarks, polluted and unfit for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., February 11, 1902.

No. 641

(Results are parts in 100,000)

Received from Dr. H. S. Braman, health officer, Homer; date received, February 14, 1902; source, well; how labeled, "From Dr. H. S. Braman." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., very slight; chlorine in chlorides, 0.80; free ammonia, 0.0005; albuminoid ammonia, 0.0022; nitrites, 0.0000; nitrates, 0.3440; total solids, 23.40; loss on ignition, 7.60; behavior during ignition, no change; mineral matter, 15.80; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., February 21, 1902.

No. 642

(Results are parts in 100,000)

Received from Dr. J. W. King, health officer, Stottsville; date eceived, March 20, 1902; source, well; how labeled, "From Jas. V. King, M. D." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., slight; chlorine in chlorides, 1.60; free ammonia, 0.0060; albuminoid ammonia, 0.0170; nitrites, 0.0023; nitrates, 1.6680; total solids, 35.60; loss on ignition, 18.80; behavior during ignition, blackened; mineral matter, 16.80; remarks, unsatisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., March 24, 1902.

No. 643

(Results are parts in 100,000)

Received from Dr. H. F. Kingsley, Schoharie; date received, March 28, 1902; source, not stated; how labeled, "From H. F. Kingsley, Schoharie." Appearance: Color, greenish-yellow tint; turbidity, distinct; sediment, considerable, brownish. Odor at 100 degrees F., slight; chlorine in chlorides, 5.10; free ammonia, 0.0570; albuminoid ammonia, 0.0105; nitrites, 0.0000; nitrates, 0.0000; total solids, 48.40; loss on ignition, 11.20; behavior during ignition, darkened; mineral matter, 37.20; remarks, unsatisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., March 31, 1902.

No. 644

(Results are parts in 100,000)

Received from Dr. O. W. Peterson, health officer, Waterloo; late received, April 5, 1902; source, not stated; how labeled, 'From O. W. Peterson, M. D." Appearance: Color, light greenish tint; turbidity, slight; sediment, very slight. Odor at 100 degrees F., slight; chlorine in chlorides, 93.20; free ammonia, 0.0280; albuminoid ammonia, 0.0042; nitrites, 0.0000; nitrates, 0.0000; total solids, 407.20; loss on ignition, 54.60; behavior during ignition, no change; mineral matter, 352.60; remarks, unsuited for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., April 12, 1902.

No. 645

(Results are parts in 100,000)

Received from Dr. J. W. King, health officer, Stottville; date received, April 7, 1902; source, well; how labeled, "From Dr. J. W. King, Stottville, N. Y." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 17.90; free ammonia, 0.0050; albuminoid ammonia, 0.0150; nitrites, 0.0111; nitrates, 2.8572; total solids, 74.80; loss on ignition, 20.40; behavior during ignition, darkened slightly; mineral matter, 54.40; remarks, polluted and unfit for use.

Dated at State Board of Health laboratory, Albany, N. Y., April 12, 1902.

No. 646

(Results are parts in 100,000)

Received from Dr. J. W. King, health officer, Stottville; date received, April 17, 1902; source, well; how labeled, "No. 1." Appearance: Color, nearly colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 3.80; free ammonia, 0.0030; albuminoid ammonia, 0.0050; nitrites, 0.0006; nitrates, 1.1760; total solids, 47.40; loss on ignition, 14.80; behavior during ignition, no change; mineral matter, 32.60; remarks, not of satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., April 23, 1902.

No. 647

(Results are parts in 100,000)

eceived from Dr. J. W. King, health officer, Stottville; date
ived, April 17, 1902; source, well; how labeled, "No. 2." Ap-
·ance: Color, light greenish tint; turbidity, none; sediment,
slight. Odor at 100 degrees F., slight; chlorine in chlorides,
; free ammonia, 0.0115; albuminoid ammonia, 0.0080; nitrites,
12; nitrates, 2.2200; total solids, 39.20; loss on ignition, 20.89;
ivior during ignition, darkened slightly; mineral matter,
0; remarks, cannot be recommended for domestic use.

ated at State Board of Health laboratory, Albany, N. Y.,
il 23, 1902.

No. 648

(Results are parts in 100,000)

eceived from Dr. J. W. King, health officer, Stottville; date
ived, April 17, 1902; source, well; how labeled, "No. 3." Ap-
·ance: Color, decided greenish-yellow tint; turbidity, slight;
ment, slight. Odor at 100 degrees F., none; chlorine in chlo-
s, 1.60; free ammonia, 0.0045; albuminoid ammonia, 0.0190;
ites, 0.0002; nitrates, 1.8160; total solids, 37.80; loss on ig-
on, 15.60; behavior during ignition, blackened; mineral mat-
22.20; remarks, cannot be recommended for domestic use.

ated at State Board of Health laboratory, Albany, N. Y.,
il 23, 1902.

No. 649

(Results are parts in 100,000)

eceived from Dr. J. M. Townsend, health officer, Trumans-
; date received, April 17, 1902; source, well; how labeled,
M. Townsend, M. D." Appearance: Color, light greenish
; turbidity, none; sediment, none. Odor at 100 degrees F.,
e; chlorine in chlorides, 8.70; free ammonia, 0.0017; albu-
oid ammonia, 0.0068; nitrites, 0.0000; nitrates, 1.1120; total
ls, 70.60; loss on ignition, 12.40; behavior during ignition,

darkened; mineral matter, 58.20; remarks, cannot be recommended for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., April 25, 1902.

ALBANY, *May* 5, 1902

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—I enclose herewith reports in duplicate on the analyses of four samples of water received by your order on April 24, 1902, from Dr. John Archibold, health officer, Cohoes. No description of these samples accompanied them, but I am informed that they are river water from the intake pipe and reservoirs supplying the city of Cohoes. The samples present no very striking differences. In general appearance they are all fairly good for surface water and they are all free from decided or objectionable odor. The ammonias are highest in No. 3, but compare favorably with the averages found in Mohawk and Hudson river water, and most American river waters. The same may be said of the nitrogen in nitrates. Nitrogen in nitrites, indicative of comparatively recent sewage pollution, is highest in the sample from the intake and in No. 1, and decidedly lower in Nos. 3 and 4. The water of the Hudson in this vicinity sometimes shows no nitrites, but has frequently yielded higher results than do these samples. In surface waters the presence of nitrites in appreciable quantities is an almost positive indication of recent sewage pollution, and although many cities may be supplied with waters thus contaminated, such water can never be favorably regarded.

The total solids are comparatively low, and satisfactorily so in all the samples. The loss on ignition is fairly high in each case and the residue obtained on evaporation blackened on ignition in each instance.

These waters cannot be considered as of very satisfactory quality, but they cannot be condemned from the chemical standpoint as showing evidence of gross and unusual pollution. But the fact must not be lost sight of that no chemical analysis can distinguish specifically harmful contamination, and it is very doubtful if any kind of examination can do so with certainty in such a case. And it should be borne in mind that the waters of rivers which receive the sewage of towns are in most cases unsatisfactory and unfit for city supply, and that they furnish the chief source of communication for certain water-borne diseases, that therefore any water which shows evidence of distinct ge pollution is unsafe for public use as a source of supply if it be impossible to demonstrate the presence of specific se germs in such water.

Very respectfully yours
WILLIS G. TUCKER
Director

No. 650

(Results are parts in 100,000)

ceived from Dr. John Archibold, health officer, Cohoes; date ved, April 24, 1902; how labeled, "Sample from intake." arance: Color, greenish tint; turbidity, slight; sediment, t. Odor at 100 degrees F., very slight; chlorine in chlorides, free ammonia, 0.0040; albuminoid ammonia, 0.0055; nitrites, 5; nitrates, 0.0384; total solids, 10.20; loss on ignition, 3.80; rior during ignition, blackened; mineral matter, 6.40.

ted at State Board of Health laboratory, Albany, N. Y., 5, 1902.

No. 651

(Results are parts in 100,000)

ceived from Dr. John Archibold, health officer, Cohoes; date ved, April 24, 1902; how labeled, "Sample No. 1." Appear- : Color, greenish tint; turbidity, very slight; sediment, very t. Odor at 100 degrees F., very slight; chlorine in chlorides, free ammonia, 0.0050; albuminoid ammonia, 0.0055; nitrites, 5; nitrates, 0.0408; total solids, 10.40; loss on ignition, 3.20; rior during ignition, blackened; mineral matter, 7.20.

ted at State Board of Health laboratory, Albany, N. Y., 5, 1902.

No. 652

(Results are parts in 100,000)

eived from Dr. John Archibold, health officer, Cohoes; date ed, April 24, 1902; how labeled, "Sample No. 2." Appearance: Color, greenish tint; turbidity, slight; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.15; free ammonia, 0.0070; albuminoid ammonia, 0.0065; nitrites, 0.0005; nitrates, 0.0528; total solids, 8.40; loss on ignition, 4.20; behavior during ignition, blackened; mineral matter, 4.20.

Dated at State Board of Health laboratory, Albany, N. Y., May 5, 1902.

No. 653

(Results are parts in 100,000)

Received from Dr. John Archibold, health officer, Cohoes; date received, April 24, 1902; how labeled, "Sample No. 3." Appearance: Color, greenish tint; turbidity, very slight; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0045; albuminoid ammonia, 0.0055; nitrites, 0.0006; nitrates, 0.0512; total solids, 11.20; loss on ignition, 5.60; behavior during ignition, blackened; mineral matter, 5.60.

Dated at State Board of Health laboratory, Albany, N. Y., May 5, 1902.

No. 654

(Results are parts in 100,000)

Received from Dr. G. C. Morey, health officer, Remsen; date received, May 1, 1902; source, well; how labeled, "G. C. Morey, Remsen, N. Y." Appearance: Color, greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., very slight; chlorine in chlorides, 3.40; free ammonia, 0.0255; albuminoid ammonia, 0.0105; nitrites, 0.0000; nitrates, 0.9520; total solids, 21.60; loss on ignition, 8.20; behavior during ignition, blackened; mineral matter, 13.40; remarks, advised to discontinue use for domestic purposes.

Dated at State Board of Health laboratory, Albany, N. Y., May 8, 1902.

No. 655

(Results are parts in 100,000)

Received from Wm. Dillon, secretary board of health, Wellsville; date received, May 1, 1902; source, well; how labeled, "From Van Buren well." Appearance: Color, nearly colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., very slight; chlorine in chlorides, 2.20; free ammonia, 0.0020; albuminoid ammonia, 0.0080; nitrites, 0.0000; nitrates, 0.8320; total solids, 37.20; loss on ignition, 12.80; behavior during ignition, darkened; mineral matter, 24.40; remarks, not entirely satisfactory, but results indicate comparative freedom from recent pollution.

Dated at State Board of Health laboratory, Albany, N. Y., May 8, 1902.

No. 656

(Results are parts in 100,000)

Received from Dr. J. A. Reed, health officer, Newark; date received, May 8, 1902; source, well. Appearance: Color, light greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., slight; chlorine in chlorides, 9.70; free ammonia, 0.0015; albuminoid ammonia, 0.0100; nitrites, 0.0006; nitrates, 1.6680; total solids, 89.60; loss on ignition, 28.80; behavior during ignition, darkened very slightly; mineral matter, 60.80; remarks, shows evidence of pollution and not to be recommended for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., May 13, 1902.

No. 657

(Results are parts in 100,000)

Received from Dr. N. Fanning, health officer, Catskill; date received, May 20, 1902; source, reservoir, public supply; how labeled, "From N. Fanning, M. D." Appearance: Color, decided brownish tint; turbidity, opaque; sediment, considerable. Odor at 100 degrees F., aromatic; chlorine in chlorides, 0.20; free ammonia, 0.0115; albuminoid ammonia, 0.0260; nitrites, 0.0006; nitrates, 0.0364; total solids, 57.40; loss on ignition, 12.20; behavior during ignition, blackened; mineral matter, 45.20; remarks, unfit for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., May 22, 1902.

No. 658

(Results are parts in 100,000)

Received from Dr. E. B. Belknap, health officer, Middleburg; date received, May 28, 1902; source, well. Appearance: Color, greenish-yellow tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., peculiar; chlorine in chlorides, 3.80; free ammonia, 0.0065; albuminoid ammonia, 0.0140; nitrites, 0.0190; nitrates, 0.0454; total solids, 33.80; loss on ignition, 12.20; behavior during ignition, blackened; mineral matter, 21.60; remarks, advised to discontinue use for domestic purposes.

Dated at State Board of Health laboratory, Albany, N. Y., June 6, 1902.

No. 659

(Results are parts in 100,000)

Received from Dr. Chas. L. Fletcher, health officer, South Dover; date received, June 7, 1902; source, well. Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., slight; chlorine in chlorides, 1.50; free ammonia, 0.0160; albuminoid ammonia, 0.0075; nitrites, 0.0021; nitrates, 0.5880; total solids, 26.00; loss on ignition, 8.40; behavior during ignition, darkened slightly; mineral matter, 17.60; remarks, not of satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., June 13, 1902.

No. 660

(Results are parts in 100,000)

Received from Catskill water supply; date received, June 14, 1902; source, reservoir, near outlet. Appearance: Color, greenish-yellow tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0100; albuminoid ammonia, 0.0098; nitrites, 0.0015; nitrates, 0.0132; total solids, 8.20; loss on ignition, 2.60; behavior during ignition, blackened; mineral matter, 5.60.

Dated at State Board of Health laboratory, Albany, N. Y., June 21, 1902.

No. 661

(Results are parts in 100,000)

Received from Catskill water supply; date received, June 14, 1902; source, pump well at pumping station. Appearance: Color, greenish-yellow tint; turbidity, distinct; sediment, slight. Odor at 100 degrees F., very slight; chlorine in chlorides, 0.20; free ammonia, 0.0265; albuminoid ammonia, 0.0112; nitrites, 0.0012; nitrates, 0.0148; total solids, 8.40; loss on ignition, 2.80; behavior during ignition, blackened; mineral matter, 5.60.

Dated at State Board of Health laboratory, Albany, N. Y., June 21, 1902.

No. 662

(Results are parts in 100,000)

Received from Catskill water supply; date received, June 14, 1902; source, tap at Welch's shoe store. Appearance: Color, brownish tint; turbidity, opaque; sediment, considerable. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0030; albuminoid ammonia, 0.0092; nitrites, 0.0000; nitrates, 0.0248; total solids, 16.80; loss on ignition, 4.20; behavior during ignition, blackened; mineral matter, 12.60.

Dated at State Board of Health laboratory, Albany, N. Y., June 21, 1902.

No. 663

(Results are parts in 100,000)

Received from Dr. F. H. Green, health officer, Homer; date received, June 26, 1902; source, Brown well; how labeled, "From Homer." Appearance: Color, greenish tint; turbidity, slight; sediment, considerable. Odor at 100 degrees F., peculiar; chlorine in chlorides, 2.30; free ammonia, 0.0013; albuminoid ammonia, 0.0090; nitrites, 0.0000; nitrates, 0.0000; total solids, 166.80; loss on ignition, 102.20; behavior during ignition, blackened, strong odor; mineral matter, 64.60; remarks, advised that use for domestic purposes be discontinued.

Dated at State Board of Health laboratory, Albany, N. Y., June 28, 1902.

No. 664

(Results are parts in 100,000)

Received from Dr. J. A. Reed, health officer, Newark; date received, July 10, 1902; source, well; how labeled, "No. 1." Appearance: Color, light greenish-yellow tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 2.10; free ammonia, 0.0025; albuminoid ammonia, 0.0045; nitrites, 0.0005; nitrates, 0.5120; total solids, 41.80; loss on ignition, 13.20; behavior during ignition, no change; mineral matter, 28.60; remarks, fairly satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., July 15, 1902.

No. 665

(Results are parts in 100,000)

Received from Dr. J. A. Reed, health officer, Newark; date received, July 10, 1902; source, well; how labeled, "No. 2." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 5.80; free ammonia, 0.0000; albuminoid ammonia, 0.0040; nitrites, 0.0000; nitrates, 1.4280; total solids, 89.60; loss on ignition, 34.80; behavior during ignition, no change; mineral matter, 54.80; remarks, contains too much mineral matter to render it very satisfactory for household use.

Dated at State Board of Health laboratory, Albany, N. Y., July 15, 1902.

No. 666

(Results are parts in 100,000)

Received from Dr. S. Demarest, health officer, Suffern; date received, July 18, 1902; source, pond; how labeled, "No. 1." Appearance: Color, greenish-yellow tint; turbidity, very slight; sediment, very slight. Odor at 100 degrees F., slight; chlorine in chlorides, 0.30; free ammonia, 0.0065; albuminoid ammonia, 0.0090; nitrites, 0.0020; nitrates, 0.0000; total solids, 6.80; loss on ignition, 2.20; behavior during ignition, darkened; mineral matter, 4.60; remarks, not entirely satisfactory and decidedly inferior to No. 667.

Dated at State Board of Health laboratory, Albany, N. Y., July 22, 1902.

No. 667

(Results are parts in 100,000)

Received from Dr. S. Demarest, health officer, Suffern; date received, July 18, 1902; source, service faucet from well; how labeled, "No. 2." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., slight; chlorine in chlorides, 0.30; free ammonia, 0.0023; albuminoid ammonia, 0.0045; nitrites, 0.0000; nitrates, 0.0132; total solids, 8.60; loss on ignition, 2.80; behavior during ignition, darkened; mineral matter, 5.80; remarks, good quality.

Dated at State Board of Health laboratory, Albany, N. Y., July 22, 1902.

No. 668

(Results are parts in 100,000)

Received from Dr. J. L. Hanmer, Middletown; date received, July 31, 1902; source, well; how labeled, " Benjamin street." Appearance: Color, greenish-yellow tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., very slight; chlorine in chlorides, 16.90; free ammonia, 0.0635; albuminoid ammonia, 0.0110; nitrites, 0.0000; nitrates, 0.1248; total solids, 127.80; loss on ignition, 30.40; behavior during ignition, darkened very slightly; mineral matter, 97.40; remarks, entirely unfit for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., August 4, 1902.

No. 669

(Results are parts in 100,000)

Received from Dr. H. E. Cooley, health officer, Angelica; date received, August 8, 1902; source, village water supply. Appearance: Color, greenish tint; turbidity, very slight; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0045; albuminoid ammonia, 0.0055; nitrites, 0.0071; nitrates, 0.0740; total solids, 9.60; loss on ignition, 2.20; behavior during ignition, darkened very slightly; mineral matter, 7.40; remarks, not entirely satisfactory.

Dated at State Board of Health laboratory, Albany, N. Y., August 13, 1902.

No. 670

(Results are parts in 100,000)

Received from C. McCarty, Gouverneur board of health; date received, August 11, 1902; source, spring; how labeled, "From Gouverneur, N. Y." Appearance: Color, nearly colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., slight, earthy; chlorine in chlorides, 0.20; free ammonia, 0.0015; albuminoid ammonia, 0.0035; nitrites, 0.0000; nitrates, 0.0452; total solids, 25.40; loss on ignition, 6.20; behavior during ignition, darkened slightly; mineral matter, 19.20; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., August 13, 1902.

No. 671

(Results are parts in 100,000)

Received from Dr. G. F. Rogan, health officer, Medina; date received, August 12, 1902; source, driven wells, public supply; how labeled, "From Dr. Geo. F. Rogan." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.80; free ammonia, 0.0000; albuminoid ammonia, 0.0045; nitrites, 0.0000; nitrates, 0.1668; total solids, 23.20; loss on ignition, 8.40; behavior during ignition, no change; mineral matter, 14.80; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., August 19, 1902.

No. 672

(Results are parts in 100,000)

Received from Dr. R. A. Whitney, health officer, Liverpool; date received, August 19, 1902; source, well; how labeled, "Bretzer well." Appearance: Color, greenish-yellow tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 2.40; free ammonia, 0.0395; albuminoid ammonia, 0.0145; nitrites, 0.0420; nitrates, 0.5720; total solids, 64.60; loss on ignition, 24.80; behavior during ignition, blackened; mineral matter, 39.80; remarks, grossly polluted and entirely unfit for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., August 21, 1902.

No. 673

(Results are parts in 100,000)

Received from Dr. R. A. Whitney, health officer, Liverpool; date received, August 19, 1902; source, well; how labeled, "Wiegand well." Appearance: Color, very slight smoky tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., very slight; chlorine in chlorides, 2.50; free ammonia, 0.0005; albuminoid ammonia, 0.0045; nitrites, 0.0120; nitrates, 1.0520; total solids, 63.40; loss on ignition, 23.80; behavior during ignition, darkened slightly; mineral matter, 39.60; remarks, recommended that use for domestic purposes be discontinued.

Dated at State Board of Health laboratory, Albany, N. Y., August 21, 1902.

No. 674

(Results are parts in 100,000)

Received from Dr. E. M. Austin, Tupper Lake; date received, September 13, 1902; source, not particularly stated; how labeled, "Reservoir water." Appearance: Color, deep yellowish-brown tint; turbidity, none; sediment, none. Odor at 100 degrees F., slight; chlorine in chlorides, 0.10; free ammonia, 0.0110; albuminoid ammonia, 0.0240; nitrites, 0.0000; nitrates, 0.0152; total solids, 7.40; loss on ignition, 3.80; behavior during ignition, blackened; mineral matter, 3.60; remarks, contamination chiefly of vegetable origin, but such water cannot be recommended for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., September 19, 1902.

No. 675

(Results are parts in 100,000)

Received from Dr. S. A. Wessels, health officer, Canajoharie; date received, September 16, 1902; source, public supply. Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., very slight; chlorine in chlorides, 0.80; free ammonia, 0.0018; albuminoid ammonia, 0.0030; nitrites, 0.0023; nitrates, 0.0184; total solids, 30.80; loss on ignition, 6.60; behavior during ignition, no change; mineral matter, 24.20; remarks, not entirely satisfactory.

Dated at State Board of Health laboratory, Albany, N. Y., September 19, 1902.

No. 676

(Results are parts in 100,000)

Received from Dr. F. H. Green, health officer, Homer; date received, October 15, 1902; source, well; how labeled, "Brown well." Appearance: Color, light greenish tint; turbidity, slight; sediment, considerable. Odor at 100 degrees F., peculiar; chlorine in chlorides, 2.70; free ammonia, 0.0015; albuminoid ammonia, 0.0070; nitrites, 0.0000; nitrates, 0.0000; total solids, 90.40; loss on ignition, 15.60; behavior during ignition, blackened; mineral matter, 74.80; remarks, advised to discontinue use for domestic purposes.

Dated at State Board of Health laboratory, Albany, N. Y., October 18, 1902.

No. 677

(Results are parts in 100,000)

Received from Dr. J. H. Bogart, health officer, Roslyn; date received, December 5, 1902; source, pond; how labeled, "From J. H. Bogart." Appearance: Color, deep brown; turbidity, very slight; sediment, slight. Odor at 100 degrees F., disagreeable; chlorine in chlorides, 0.90; free ammonia, 0.0030; albuminoid ammonia, 0.0400; nitrites, 0.0000; nitrates, 0.0000; total solids, 19.60; loss on ignition, 15.40; behavior during ignition, blackened; mineral matter, 4.20; remarks, cannot be recommended as a source of ice for domestic use.

Dated at State Board of Health laboratory, Albany, N. Y., December 13, 1902.

No. 678

(Results are parts in 100,000)

Received from Dr. E. R. Osterhout, health officer, Trumansburg; date received, December 9, 1902; source, well; how labeled, "No. 1, from well of Dr. A. Chace." Appearance: Color, very light greenish; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 4.40; free ammonia, 0.0015; albuminoid ammonia, 0.0060; nitrites, 0.0000; nitrates, 1.0520; total solids, 62.20; loss on ignition, 20.80; behavior during ignition, darkened very slightly; mineral matter, 41.40; remarks, under circumstances as stated, advised to discontinue use for domestic purposes.

Dated at State Board of Health laboratory, Albany, N. Y., December 17, 1902.

No. 679

(Results are parts in 100,000)

Received from Dr. E. R. Osterhout, health officer, Trumansburg; date received, December 9, 1902; source, well; how labeled, "No. 2, from well of Wm. Batty." Appearance: Color, light greenish tint; turbidity, none; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 2.90; free ammonia, 0.0000; albuminoid ammonia, 0.0020; nitrites, 0.0000; nitrates, 0.8320; total solids, 43.60; loss on ignition, 7.20; behavior during ignition, no change; mineral matter, 36.40; remarks, better than No. 678, but under circumstances stated would advise to discontinue use of this water for the present.

Dated at State Board of Health laboratory, Albany, N. Y., December 17, 1902.

No. 680

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 1, Niagara Falls, N. Y." Appearance: Color, light greenish tint; turbidity, none;

sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 8.40; free ammonia, 0.0035; albuminoid ammonia, 0.0040; nitrites, 0.0000; nitrates, 0.3240; total solids, 71.20; loss on ignition, 19.40; behavior during ignition, no change; mineral matter, 51.80; remarks, total solids chlorine and nitrates high but otherwise of satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 22, 1902.

No. 681

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 2, Niagara Falls, N. Y." Appearance: Color, greenish-yellow tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 11.30; free ammonia, 0.0005; albuminoid ammonia, 0.0065; nitrites, 0.0000; nitrates, 0.4360; total solids, 136.40; loss on ignition, 25.80; behavior during ignition, no change; mineral matter, 110.60; remarks, total solids, chlorine and nitrates, high but otherwise of satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 22, 1902.

No. 682

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 3a, Niagara Falls, N. Y." Appearance: Color, very light greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.80; free ammonia, 0.0000; albuminoid ammonia, 0.0010; nitrites, 0.0000; nitrates, 0.0000; total solids, 10.20; loss on ignition, 2.80; behavior during ignition, darkened; mineral matter, 7.40; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 22, 1902.

No. 683

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 3b, Niagara Falls, N. Y." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.70; free ammonia, 0.0005; albuminoid ammonia, 0.0040; nitrites, 0.0000; nitrates, 0.0000; total solids, 15.80; loss on ignition, 4.20; behavior during ignition, darkened; mineral matter, 11.60; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 22, 1902.

No. 684

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 4, Niagara Falls, N. Y." Appearance: Color, very light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 1.40; free ammonia, 0.0000; albuminoid ammonia, 0.0005; nitrites, 0.0000; nitrates, 0.0484; total solids, 39.40; loss on ignition, 7.80; behavior during ignition, darkened; mineral matter, 31.60; remarks, fairly satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 22, 1902.

No. 685

(Results are parts in 100,000)

Received from Prof. O. H. Landreth; date received, November 26, 1902; source, not stated; how labeled, "No. 5, Niagara Falls, N. Y." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.70; free ammonia, 0.0000; albuminoid ammonia, 0.0020; nitrites, 0.0000; nitrates, 0.0000; total solids, 14.20; loss n ignition, 4.80; behavior during ignition, darkened; mineral natter, 9.40; remarks, satisfactory quality.

Dated at State Board of Health laboratory, Albany, N. Y., ecember 22, 1902.

No. 686

(Results are parts in 100,000)

Received from Frank L. Moran, secretary board of health, Watkins; date received, December 4, 1902; source, village supply; how labeled, "Sample No. 1." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 4.80; free ammonia, 0.0020; albuminoid ammonia, 0.0055; nitrites, 0.0000; nitrates, 0.0328; oxygen consumed, 0.0915; total solids, 26.80; loss on ignition, 2.60; behavior during ignition, darkened very slightly; mineral matter, 18.20; hardness, 10.90; remarks, excellent quality.

Dated at State Board of Health laboratory, Albany, N. Y., December 26, 1902.

No. 687

(Results are parts in 100,000)

Received from T. H. Green, secretary board of health, McGraw; late received, December 20, 1902; source, Robert Clegg's well; ow labeled, "From Secretary of Board of Health, McGraw, . Y." Appearance: Color, very light greenish tint; turbidity, one; sediment, none. Odor at 100 degrees F., peculiar aromatic dor; chlorine in chlorides, 0.10; free ammonia, 0.0490; albu inoid ammonia, 0.0655; nitrites, 0.0000; nitrates, 0.3280; [illegible] lids, 18.20; loss on ignition, 3.80; behavior during ignition, rkened slightly; mineral matter, 14.40; remarks, polluted [illegible] fit for domestic use.

Dated at State Board of Health laboratory, Albany, [illegible] ember 30, 1902.

KEROSENE OIL

During the year, as previously stated, 52 samples of l oil were examined. All the samples were sold as (illuminating oil except sample No. 8771, which was of tl designated by law for use on cars and boats. In makii tests the New York state instrument, adopted in 18 used, and precisely in the manner prescribed in the instructions. A description of the instrument, with di for applying the test, has recently been reissued as a which may be obtained from the Department. This also gives an abstract of the sections of the Domestic co law, chapter 376 of the laws of 1896, relating to the st sale and testing of illuminating oils and other matt taining thereto.

Of the 52 samples tested, one was of legal standard; above this standard; two were slightly, and 39 far be standard. But it is not to be inferred that these results i that the oil sold in this state is generally of inferior because most of these samples were purposely purch places where inferior oil was believed to be sold. Neve the results are significant and alarming, indicating as that low grade and dangerous oil is freely and frequen in some parts of this state at least. Particulars concern samples tested in tabular form are appended:

Number of sample	Date received		OF WHOM PURCHASED	Where purchased	Flashing point	Quality
	1902.					
8720	May	6	Hisgen Brothers	Albany	79°	Much below standard.
8721	May	8	J. M. C. Verplanck	Albany	79°	Much below standard.
8722	May	8	M. Lochman	Albany	83°	Much below standard.
8723	May	8	C. A. Peck	Albany	81°	Much below standard.
8724	May	8	McBurney's grocery store	Albany	83°	Much below standard.
8725	May	8	Bartell's grocery store	Albany	83°	Much below standard.
8726	May	8	J. V. Stine	Albany	93°	Much below standard.
8727	May	8	J. C. Smith	Albany	79°	Much below standard.
8728	May	8	Duffy's grocery store	Albany	79°	Much below standard.
8729	May	8	Shaut's grocery store	Albany	81°	Much below standard.
8730	May	8	Conroy's grocery store	Albany	81°	Much below standard.
8731	May	8	F. Balter & Son	Albany	79°	Much below standard.
8732	May	8	W E Clark	Albany	79°	Much below standard.
8733	May	9	Hisgen Brothers	Albany	102°	Above standard.
8734	May	9	Hisgen Brothers	Albany	104°	Above standard.
8735	May	9	B. R. Lansing	Rensselaer	79°	Much below standard.
8736	May	10	E. A. Hobbs	Albany	100°	Standard.
8737	May	10	Cantwell's grocery store	Albany	79°	Much below standard.
8738	May	10	Carr's grocery store	Albany	83°	Much below standard.
8739	May	10	Kniskern's grocery store	Albany	83°	Much below standard.
8740	May	10	McMahon's grocery store	Albany	79°	Much below standard.
8741	May	10	Davis' grocery store	Albany	77°	Much below standard.
8742	May	10	A. Mosher	Albany	83°	Much below standard.
8743	May	10	Barzen's grocery store	Albany	79°	Much below standard.
8744	May	10	J. J. Scrafford	Albany	75°	Much below standard.
8745	May	10	Kelcher's grocery store	Albany	75°	Much below standard.
8746	May	10	F. D. Miller	Albany	83°	Much below standard.
8747	May	10	J. H. Cassidy	Albany	79°	Much below standard.
8748	May	20	Street oil wagon	Albany	85°	Much below standard.

Number of sample	Date received		OF WHOM PURCHASED	Where purchased	Flashing point	Quality
	1902.					
8749	May	20	Nolan & Sprott	Milton	102°	Above standard.
8750	May	20	D. W. Rose	Newburgh	98°	Above standard.
8751	May	20	J. W. Cutter	Newburgh	102°	Above standard.
8752	May	20	H. Halstead	Firthcliff	108°	Above standard.
8753	May	20	J. L. Hicks	Highland Falls	108°	Above standard.
8754	May	20	Penn. Oil Co	Hudson	79°	Much below standard.
8755	May	20	S. P. Allen & Son	Chatham	75°	Much below standard.
8756	May	20	A. B. France	Chatham	108°	Above standard.
8757	May	22	Hisgen Brothers	Albany	106°	Above standard.
8758	June	5	Hisgen Brothers	Albany	85°	Much below standard.
8759	June	5	Hisgen Brothers	Albany	104°	Above standard.
8760	June	5	Hisgen Brothers	Albany	104°	Above standard.
8761	June	12	George C. Layman	Kingston	79°	Much below standard.
8762	August	27	Bond & Dennison	Newburgh	106°	Above standard.
8763	August	27	Ward & Logan	Newburgh	104°	Above standard.
8764	August	27	C. O. Colden	Newburgh	104°	Above standard.
8765	August	27	Wood & Bolton	Poughkeepsie	102°	Above standard.
8766	August	27	F. G. Weeks & Co	Newburgh	104°	Above standard.
8767	August	27	A. J. Dubois	Poughkeepsie	102°	Above standard.
8768	August	28	P. A. Lasher	Kingston	108°	Above standard.
8769	August	28	Matthew Larkin	Rondout	106°	Above standard.
8770	August	29	James Van Buren	Castleton	104°	Above standard.
					Igniting point	
8771	November	26	N. Y., N. H. & H. R. R	New York City	295°	Slightly below standard.

FOODS

n addition to seven miscellaneous articles of food submitted
examination during the year and above reported upon there
'e collected by agents of the department during the latter
t of the year in different parts of the state 69 samples of
d articles including mustard, cream of tartar, coffee, cocoa
l chocolate, tomato catsup, canned tomatoes, extract of
illa, lager beer and whiskey, as above stated. Reports upon
examination of these samples were promptly transmitted,
as the work was not completed until after the close of the
r the results will be published in full in the next annual
ort of the Department.

CONCLUSION

n concluding this report the Director desires again to call
ention to the fact that a larger appropriation for carrying
the chemical work of the Department is essential if satis-
tory results are to be obtained. No systematic oversight of
kerosene oil supply has been exercised for many years
ough lack of funds available for this purpose, and this
tter alone is of supreme importance and ought no longer to
neglected. It is, therefore, again urged that adequate pro-
ion be made for this work, and the other chemical work of
Department, the needs of which have been fully stated in
eceding reports.

Respectfully submitted

WILLIS G. TUCKER

Director Bureau of Chemistry

Albany, N. Y., January 1, 1903.

TREAM POLLUTION

Stream Pollution on Some New York Streams—Abstracts from Information [illegible]

STREAM AND LOCALITY	Sewers	Stream polluted by manufacturing refuse, garbage, etc.	Stream used for.
Hudson river, Watervliet.	Entire sewer system city of Watervliet; population, 15,000.	Refuse from U. S. Arsenal and three other factories. Large amounts garbage, stable waste, and refuse from Dry river. Bank pollution from garbage dumps.	Water and ice supply for city of Albany is taken just below.
Mohawk river, Cohoes.	Entire sewer system city of Cohoes; many private sewers from mills and shops; population, 25,000.	Mill and chemical waste from large number cotton and woolen mills, bank refuse from mills; privies and private sewers; slaughter-house; barn yards and pig pens.	Cohoes water supply taken from Mohawk through the hydraulic canal.
Hudson river, Waterford.	Entire sewer system city of Waterford, with many private sewers from mills and residences.	Refuse and chemical waste from four large mills empty into canal overflow to river. Bank refuse from dye works, knitting mills, paper mills, saw mills and canning factory.	Waterford water supply taken from Hudson, near large sewer; city of Troy water supply taken just below this entire pollution.
Hudson river, Cornwall.	Sewers and drains from large shop and a dozen residences.	Manufacturing and chemical waste from carpet mill, paper mill, and two flour mills; 500 employees.	....
Hudson river, Troy...	Entire sewer system city of Troy; population, 72,000.	Manufacturing refuse and chemicals from 24 mills, factories, breweries, packing establishments, laundries; aggregating 7,000 employees.	Troy water and ice supply taken from Hudson below pollution from Cohoes and Waterford.
Hudson river and Rondout creek, Kingston.	One-half of entire sewer system empties into creek and river.	Large amounts of garbage and bank refuse from Rondout.	Kingston ice supply cut from polluted portion Rondout creek.
Esopus creek, Kingsston.	One-half of entire sewer system empties into Esopus creek.	Some manufacturing waste and bank refuse...	....

STREAM POLLUTION ON SOME NEW YORK STREAMS—*Continued*

STREAM AND LOCALITY	Sewers	Stream polluted by manufacturing refuse, garbage etc.	Stream used for.
Hudson, river, Coxsackie.	Entire village sewer system; population, 2,700.	....	City of Hudson takes water supply from Hudson river, eight miles below Coxsackie. Large amounts of ice cut just below sewer outlets.
Hudson river, Castleton.	Private sewers from 25 residences.	Manufacturing waste from paper mills, piano action factory; 300 employees.	....
Hudson river, Albany.	Entire sewer system city of Albany; population, 95,000.	Manufacturing waste bank refuse and garbage from commission houses.	Ice fields immediately below city, and have many mills down stream.
Hudson river, Athens.	Sewer system from one-third of village.	Bleaching and scouring from woolen mills.....	City of Hudson water supply taken from river opposite Athens; ice cut just below Athens.
Hudson river, Hudson.	Sewer system of city of Hudson.	Refuse from mills, brewery, slaughter-house and iron-works.	City water supply taken from river between principal outlets.
Hudson river, Poughkeepsie.	Entire sewer system of the city; sewer system from one-half inmates State asylum.	Manufacturing refuse and sewage from several mills and factories. aggregating 1,000 employees.	Water supply taken from river below asylum sewer; partially purified by filtration.
Hudson, river, Newburgh.	Entire sewer system of the city; population, 24,000; covering 20 miles of sewers.	Sewers and manufacturing refuse from felt mills and other concerns, aggregating 7,000 employees.	....
Hudson river, Catskill.	Entire sewer system of the city of Catskill empties into Catskill creek, 1,000 feet from its junction with river.	Manufacturing waste, bleaching and dyeing materials, sewage from mills, aggregating 500 employees.	Water supply from Hudson river; ice harvested below mouth of creek.

Island.	village; population, [illegible]	employees; Troy garbage dump on bank.	dump; ice harvested below village.
Hudson river, Mechanicville.	Entire sewer system of village; population, 5,000; 10 miles of sewers...........	Refuse from knitting mills, hat mills, sash and blind factory, canning factories, paper and pulp mills, shirt factories; stagnant, offensive mill pond on Anthonykill, tributary of river.	Ice is harvested below village and the water supply of Troy and Waterford are taken from the river below this place.
Hudson river, Sandy Hill.	Entire sewer system of village; population, 12,000; 12 miles of sewers.	Mill refuse and sewage from paper mills, sulphite mills, ground pulp mills, wall paper and print mills; chemicals, bleaching refuse.	Ice is harvested from river at Fort Edward, below Sandy Hill.
Hudson river, Fort Edward.	Sewers from about one-half the village.	Refuse from ground pulp mill and sulphite mill, aggregating about 1,100 employees; garbage and bank refuse.	River water is used at times to supplement the regular supply.
Hudson river, South Glens Falls.	....	Garbage and bank refuse; refuse from paper mill and ground pulp mill.	River used for ice supply at Sandy Hill, 2 miles below.
Hudson river, Glens Falls.	Entire sewer system of village, comprising 30 miles of sewers; population, 12,600; empties indirectly into river.	Manufacturing refuse and sewage from shirt factories, paper and pulp mills, employing 1,500 hands.	....
Hudson, river, Spiers Falls	No sewer system...........	Night soil, garbage and other camp refuse from large construction camp of 1,500 at Spiers Falls; camp drain into river; 5 large camp barns and pig pens.	....
Lake George, Silver Bay.	Lake polluted by sewage; overflow from cess-pools at Silver Bay. Hotel accommodating about 500 guests.	....	....
Lake George, Hotel Marian.	Lake polluted from overflow of cess-pools from hotel Marian, accommodating about 500 guests during the summer months.	....	....

STREAM POLLUTION ON SOME NEW YORK STREAMS—*Continued*

STREAM AND LOCALITY	Sewers	Stream polluted by manufacturing refuse, garbage, etc.	Stream used for.
Lake George, Caldwell.	No sewers; numerous cesspools, many near bank of lake.	Steamboats dump sewage garbage into lake	
Trout Brook, near Lake George.	1 hotel and 25 cottages, sewer directly into brook, within 1,000 feet of Lake George.		
Ticonderoga creek, Ticonderoga.	Private sewers of hotels, cottages, residences; village population, 2,000.	Refuse and sewage from paper mills and pulp mills employing 800 hands.	
Lake Champlain, Whitehall.	Entire sewer system into lake.	Dye stuffs, chemicals and waste from silk mills into lake.	Fish are driven out by chemicals. Village supply of ice is harvested from polluted part of lake.
Canajoharie creek, Canajoharie.	Many individual sewers; no public system.	Refuse from two slaughter-houses and four cheese and creamery factories.	Creek used for harvesting ice.
Mohawk river, Fort Plain.	Entire sewer system; population, 3,000; comprising five miles of sewers.	Refuse from milk condensory employing 30 men.	Used by milk condensory; and harvesting ice.
Otsquago creek, Fort Plain.		Garbage and domestic refuse from one slaughter-house and one creamery.	Water power and creamery purposes.
Garoga creek, mouth of creek.		Refuse and sewage from 3 paper mills and woolen mills from 3 to 7 miles above mouth.	Water power and agricultural purposes.
Mohawk river, St. Johnsville.		Badly polluted by Zimmeramans (which see)	Harvesting ice.
Zimmeramans creek, St. Johnsville.	20 or 30 individual sewers	Refuse and sewage from knitting mills, milk condensory and one slaughter-house.	Water power and agricultural purposes.
Klock creek, Upper St. Johnsville	Sewage from upper St. Johnsville.	Garbage and bank refuse	Factory and agricultural purposes.

East Canada creek outlet.	Sewage from Dolgeville.....	Creamery refuse below Dolgeville............	Creamery and agricultural purposes.
Mohawk river, Little Falls.	Entire sewer system of Little Falls; population, 11,000; 14 miles of sewers and 5 outlets.	Manufacturing waste, dye wash and sewage from 8 knitting mills, employing 3,000 hands; large amounts of refuse from one tannery and one slaughter-house.	Ice harvested above sewer outlets.
West Canada creek, Herkimer.	....	Sewage from Middleville, 7 miles above, and creamery waste from 3 miles above.	Used for agricultural purposes.
Mohawk river, Ilion..	Entire sewer system; population, 5,500; 11 miles sewers.	....	....
Mohawk river, Utica..	Entire sewer system; population, 65,000; 77 miles sewer; nine outlets; sewers from State Hospital and Masonic Home.	Garbage, ashes, stable manure in quantities; also dye wash from several knitting mills; one slaughter-house.	Ice is cut for cooling purposes here.
Mohawk river, Rome..	2 miles of city sewers from 700 population; several private sewers, one from County Home, 300 inmates.	Some garbage, one slaughter-house, one milk station. Water supply in river at Ridge Mills polluted by sewage and manure from boats on Black River canal.	....
Wood creek, Rome...	27 miles of sewers, used by 17,000 population; storm sewers.	Some garbage and ashes....................	Ice is cut above sewer outlets
Mill creek, Booneville.	Public and private sewers, half of village; other half sewers into Black River canal and thence into Rome water supply at Ridge Mills.	Limburger cheese factory, several wood-working establishments, one slaughter-house.	....
Cincinnati creek, Remsen.	....	Garbage, horse manure, drainage from privies on banks; slaughter-house, milk station; stream very bad.	Used for cutting ice, and agricultural purposes.
Mohawk river, Amsterdam.	Entire sewer system of city; population, 24,000; comprising 25 miles of sewers with 12 outlets, and 5 miles of surface sewers with 11 outlets.	Garbage and bank refuse and quantities of manufacturing waste and chemical refuse from Chuctanunda creek (which see).	Ice is cut from the river below some of the outlets. River used for water supply for Cohoes, and an occasional supply for Schenectady.

STREAM POLLUTION ON SOME NEW YORK STREAMS—*Continued*

STREAM AND LOCALITY	Sewers	Stream polluted by manufacturing refuse, garbage, etc.	Stream used for.
Chuctanunda creek, North Amsterdam.	Sewage, Rocton suburb; population, 2,000.	Manufacturing waste and sewage from 6 large mills employing 4,000 hands.	Stream too foul for any use except power and as an open sewer.
Chuctanunda creek, (So.) Amsterdam.	....	Small amount of mill waste from two or three mills.	....
Chuctanunda creek, No. Hagamans.	Sewage from 7,000 population; enters through private sewers.	Dye wash and sewage from knitting mill employing 330 hands; also sewage and garbage from hotel.	Ice harvested from pond through which stream flows.
Mohawk river, Fonda	Entire sewer system of village comprising 3 miles of sewers	....	Ice is harvested from river.
Cayadutta creek, Fonda.	Entire sewer system of the cities of Gloversville, population, 18,000; Johnstown, population, 12,000.	Immense quantities of tannery and leather mill waste from Gloversville and Johnstown.	....
Moose river, Lyons Falls.	Private sewers from houses and mills.	Waste from four pulp mills, paper mill, sawmill, garbage.	Water power, cutting ice and agricultural purposes.
Black river, Lyons Falls.	Sewage from pulp mill.......	Refuse from pulp and sulphite mill here, and from one at Port Leyden, three miles above; creamery and cheese factory waste.	Water power, cutting ice and agricultural purposes.
Mill creek, Lowville..	Most of village sewers into this stream by private sewers. No public system.	One slaughter-house, two milk stations, and one creamery.	Water power and agricultural purposes.
Black river, Carthage	Entire sewer system; population, 3,000; private sewers.	Knitting mill, pulp mill, sulphite pulp mill, paper mill, tissue paper mill, grist mill, sash and blind works, and saw mill, slaughter-house, milk station	Used for domestic supply for Carthage and West Carthage, also harvesting ice.
Black river, above Watertown.	....	Sewage and waste from five or six large paper mills, and two paper and pulp mills situated from 7 to 14 miles above Watertown.	Used for domestic supply for Watertown; water very bad.

	population; 25 miles sewers. Beside sewage from factories, mills, and individual sewers.	soap rendering works, grist mills, wagon factories, silk mill, machine shops, a creamery, barn yards, etc. The public water supply is reputed to be very bad and unwholesome. Much sickness.	
Furnace creek, Little Falls.	....	Bank pollution from garbage, domestic refuse and privies.	....
Cemetery creek, Little Falls.	....	Large quantities of garbage and bank refuse. Swamp drainage, and stable drainage.	....
Mohawk river, Herkimer.	Entire sewer system; population, 6,000; 12 miles of sewers.	Pollution from garbage; from rendering works.	....

STREAM POLLUTION ON SOME NEW YORK STREAMS—*Concluded*

STREAM AND LOCALITY	Stream polluted by manufacturing refuse, garbage, etc.
Ausable river, Keeseville	The water supply of the village of Keeseville is polluted by the discharge of sulphite liquor from mills at Ausable Forks. Also by the sewage from the village and summer hotels at Lake Placid.
Ausable river, Wilmington	The village of Wilmington is dependent mainly on the Ausable river, west branch; this stream is polluted by the sewage of the village and summer hotels at Lake Placid. Much sickness and typhoid has occurred at Wilmington, traceable directly to this source.
Susquehanna river, Binghamton	Binghamton water supply from river polluted by sewage from Great Bend, Susquehanna, Sydney, Oneonta, Cooperstown, Norwich, Marathon, Courtland, Homer and many smaller places. Water supply now partially purified by filtration.
Chemung river, Elmira	Water supply polluted by sewage from Corning, Painted Post, Canisteo, Hornellsville, Bath, and many smaller places. Water supply now partially purified by filtration.
Saranac river, Saranac Lake village	Water supply polluted by a large number of summer hotels.
Skaneateles lake, Syracuse	Water supply from Skaneateles lake directly polluted by sewage of 400 residents of Skaneateles village.
Seneca lake, Geneva	Water supply polluted by sewage from Willard State asylum, Penn Yan, and many other villages farther up the lake.
Seneca river, Waterloo	Water supply polluted by sewage from city of Geneva and all other polluting sources on Seneca lake.
Tonawanda creek, Batavia	Water supply polluted by sewage and garbage from Batavia, Attica, Alexander.
Niagara river, Tonawanda and North Tonawanda.	Water supply of both cities polluted by entire sewage of city of Buffalo.
Niagara river, Niagara Falls	Water supply polluted by sewage of Buffalo, Tonawanda and North Tonawanda.
Erie canal, Lockport	Water supply taken through Erie canal from Niagara river, receiving a large proportion of the sewage of the city of Buffalo.
Oswego river, Oswego	Water supply polluted by sewage from Fulton, Phœnix, Syracuse, Solvay, Auburn, Geneva, Waterloo, Seneca Falls, Ithaca, Watkins, Penn Yan, and many smaller towns.
Black river, Watertown	Water supply polluted by sewage from Carthage, Lowville, Lyons Falls, Port Leyden, and from a large number of pulp mills, paper mills and other manufacturing establishments.
Oswegatchie river, Ogdensburg	Water supply polluted by sewage from Gouverneur, De Kalb, and by numerous pulp and paper mills.

	water supplies of Watervliet, Cohoes, Schenectady (at times) polluted by sewage and manufacturing waste from Schenectady, Amsterdam, Fonda, Johnstown, Gloversville, St. Johnsville, Fort Plain, Canajoharie, Little Falls, Herkimer, Utica, Rome, and other smaller places.
Hudson river, various places	The water supply of Poughkeepsie (partially purified by filtration), Catskill, Hudson, Albany (purified by filtration), Troy, Lansingburg, Waterford, and several other smaller villages are polluted by sewage from the cities and towns on the Hudson above these points respectively, and by the sewage brought down by the Mohawk river, as indicated in previous paragraph.

Bacteriological Laboratory.

REPORT ON THE WORK DURING THE YEAR 1902

Diphtheria—Number of examinations, 637.

First diagnosis, 440—Positive, 252.
Negative, 188.

Cultures for release, 197—Positive, 125.
Negative, 72.

Sputum—Number of examinations, 39.
Positive, 20.
Negative, 19.

Widal—Number of examinations, 25.
Positive, 14.
Negative, 11.

Water—Number of examinations, 98.
Condemned, 58.
Pure, 40.

Miscellaneous—Number of examinations, 14.

Proceedings of the Conference
OF THE
Sanitary Officers of the State.

oceedings of the Conference of Sanitary Officers of the State of New York, Capitol Albany
October 30, 31, 1902.

OPENING ADDRESS BY COMMISSIONER LEWIS

ENTLEMEN.—Last year, when we appointed this conference,
were trying an experiment so far as the State of New York
s concerned. We did not know how many would attend;
did not know how freely you would make use of the pro-
ım which was offered, whether you would discuss the papers
l ask questions. We found that there was no difficulty in
ting all the talk we wanted from all of you, and we expect
t you will do the same thing this year.

Ve are here for the purpose of extracting or in any other
y securing all the information which the gentlemen who
e kindly consented to open discussions have to give us.

have nothing to say to you now except to give you a gen-
l idea of the plan of procedure.

n the first place you will notice that the program, of which
ı have a copy, has provided for the discussion of topics of
ecial interest to us as health officers of this state. You
l also notice that men who are well known as authorities
questions connected with sanitation and public health (and
s even includes Judge Warner, who is going to talk about
public health law) men who are able to instruct us on
points of every-day administration of the health officer's
ies will address you.

would also remind you that the same plan which we fol-
ed last year of having questions which any gentleman wishes
ısk the speaker passed up to the desk will be continued and the
stions will be answered, provided of course the speaker is able
ınswer them.

You know this is a kind of doctors' meeting, and it is perfectly legitimate for a man to give an opinion, whether it is right or wrong, and defend it. That is what we expect these speakers to do, and it is our business to defend or prove, as the case may be.

There are a few questions, which were discussed last year, which I wish to allude to briefly: In the first place, the question of the printing of the proceedings of last year. The conference requested that the proceedings be printed for distribution. They have been printed for distribution and will be distributed here to-day. The reason why they were not distributed before was the lack of an appropriation to pay for the printing. That brings out a question which interests us all the time and doubtless interests you in your own municipalities, namely the lack of appropriations; and we hope that one of the results of this conference will be that your influence will go to your home district and be exerted for the purpose of securing an appropriation for the things which we require in the administration of the public health laws.

I suppose you are all familiar with the attempt made last winter to pass a so-called compulsory vaccination law. The bill provided a great many particulars as to procedure. For example an employer of ten or more men in factories, stores, schools, military academies, prisons, etc. was required to do certain things; and there were penalties attached for failure to be vaccinated as the law provided.

This department after thoroughly considering the matter did not approve of that measure or endeavor to pass it, believing that the question of vaccination should be left with the local health officers to enforce; and the substitute which we offered was that the State Commissioner of Health may, when the necessities of a case require, order vaccination in any particular district. That was deemed a good feature, simply to back up the local health officer, who we claim has that power to-day without any assistance from us. It seems however that the local health officer desires some authority to back him up and we wanted to provide such authority.

o great attempt was made to pass the measure because the ocates of the compulsory vaccination law, so called, insisted n their bill or nothing, and so we have nothing. It is pos- e that a similar amendment to the public health law may resented next year. If so it is hoped that this conference consider the questions as they are brought out in discus- with that end in view, because if we are to have any legis- on it must be secured through the co-operation of the health ers.

ne other question which was discussed at the last meeting the method of appointing the health officers, and it was osed (and this was incorporated into a bill) that a Board Iealth simply nominate the health officer to this Department appointment.

iasmuch as this Department is now obliged to certify to a th officer's qualifications, which we do in a perfunctory way, knowing anything about the man's qualifications, it is a dead er, and it was thought that we ought to have the approving of appointment, at least have enough to do with it so that we ild be satisfied of a man's qualifications, and not simply cer- that he has been appointed by a certain board of health. Some ou will remember that we tried to have the health officer ointed for a definite term of four years in order that he may y out such plans as he may have in view for the improve- it of sanitary conditions in his own municipality, and that nay not be removed after every town meeting.

has seemed to us that the health office is of sufficient im- tance that it should be dignified by a definite term, and we proposed that the minimum salary should be $100. That with so much opposition from the health officers who are iving more, or less, that it was dropped from the bill; but the was not passed.

believe that such legislation is important and essential, and it that we may have better success this year. We can suc- l in some such measure if you all appreciate the importance t. It is possible that this question may be discussed later n the conference.

We have been exceedingly fortunate this year, in coming from the meeting at New Haven of the State and Provincial Boards of Health and bringing with us (of course they didn't come on the same train) two distinguished men, Dr. Bracken of Minnesota and Dr. Bryce, Secretary of the Board of Health of Ontario. Dr. Bracken requested me to introduce him to you and promised that he would make a few appropriate remarks:

Dr. Bracken:

MR. CHAIRMAN AND GENTLEMEN—Dr. Lewis has certainly used rather a trick in introducing me. I made no such request of him. I think it was understood that Dr. Bryce was to speak first and I was simply to endorse whatever he said, that I was to get off as easily as that.

I am heartily in sympathy with the work you are undertaking in this conference. I believe a great deal of good can be done throughout the states by these various state sanitary conferences.

Dr. Lewis remarked that this was the second meeting of this character. I may say that Minnesota is in about the same position as New York in that matter. The question of having a state conference had been talked over for years there but nothing was done until last year, and we had a very satisfactory meeting at that time and organized a state association, and we expect to have a good meeting again this year in December.

One of the great troubles in sanitary problems is that we are working as individuals rather than as a body of individuals. We have no chance to know what others are doing and we are largely self-educated sanitarians. The work of the sanitarian is practically quite new in this country, and as a consequence as questions come up in a new community the result is that some physician is chosen to take charge of the matter and he works out for himself problems that he may have thought little of in the past, as his attention may have been taken up largely with general medicine or with surgery.

Preventive medicine is one of the most important matters that we have to deal with at the present time, and as a matter of fact there is a good deal more satisfaction in preventive medicine than in the so-called curative medicine. It is a great deal more of a satisfaction to avoid illness than it is to treat the conditions when they are once present. The field of preventive medicine is large and the workers are coming more and more into prominence, and the time will come when the sanitarian will be represented by a very important branch of medicine.

I do not think it is necessary to take up any more of your time. I certainly appreciate the invitation that Dr. Lewis gave me to be with you at this time, and it is a satisfaction to see so many in attendance, and it will also be a satisfaction to me to be familiar with the work that other states are now doing.

Dr. Lewis—It is understood, doctor, that you are a member of this conference, to take part in all discussions that may come up. The reason that I did not call upon Dr. Bryce first, although I had promised to, was that he is to read a paper later on in the conference, and it is somewhat risky for a man to make a speech when he is going to read a paper afterwards. It might injure the paper, you know—of course the speech would be all right. At the same time the conference wishes to hear from Dr. Bryce.

Dr. Bryce:

GENTLEMEN—It has afforded me a great deal of pleasure indeed, I assure you, to accept the doctor's invitation to be present with you this afternoon and to-morrow in connection with this second conference of your state sanitary officers, and the doctor has explained to you how it has been possible for me and Dr. Bracken to be present with you, and I may say that several communications have passed between the doctor and me, between Ontario and New York, which I think have led me to be here under the doctor's invitation—several of these communications being in the shape of smallpox patients, coming from New York to Ontario—I had to out of courtesy to the smallpox patients come over and explain to the doctor how they got on after they got over to Ontario.

I may say that the work that you have undertaken here is one which, though new for you, is an older one with us, I think this year having been the sixteenth year of the annual meeting of the Association of Health Officers of our province. I may say that, in your youthful enthusiasm you have developed a larger number of members present to-day than we have had in recent years, but you will find out, as Dr. Bracken has said, that the work that you are undertaking as associated health officers is the most valuable kind of work that it is possible for you to undertake.

I know nothing that has so helped forward public health work in our province as the annual meetings of the working executive officers of our different cities, towns and villages. I know that in meeting them and becoming their friend and becoming acquainted with their local needs, I was doing the work of the provincial officer, while I was at the same time encouraging and helping them in carrying out the difficult work of local health officers. They had their difficulties and I had mine, and I am very glad to be able to say to you that the association with my fellow health officers has become the pleasantest of all my yearly gatherings that I have to do with. I have come for years to the American Public Health Association and have many dear friends there, but it is my own officers, those that are working with me day by day and year by year, that I feel in closest touch with, because I know their difficulties and they know mine, and when there is smallpox or other dangers on hand it is very necessary that we should all stand shoulder to shoulder.

I shall be very pleased indeed, gentlemen, to accept your president's invitation to take part in your discussions.

I thank you.

Dr. Lewis—The remarks of Dr. Bryce remind me of one thing I would like to have said to you, namely, since the conference of last year there has been marked improvement, especially in the bureau of vital statistics, in this office, and which I attribute largely, if not altogether, to the influence of the members who attended the conference, with their own boards of health.

While one year ago, over one hundred of the fifteen hundred boards in the state were delinquent in sending their reports of births and deaths, to-day there are only thirty delinquents, and at that rate we shall soon be getting reports from the various registrars, which will greatly enhance the value of the statistics kept in this office.

It affords me great pleasure to present to you Deputy Attorney-General Warner, who will now address the conference upon the subject of " The Law and the Health Officer."

THE LAW AND THE HEALTH OFFICER

Mr. Warner:

The subject of my address is suggestive in one way, at least, of what you may expect of me.

You will not be justified in anticipating mere entertainment, for, gathered here, as you are, for the purpose of general discussion and mutual benefit, you are entitled to assume that the "rank outsider" will fit himself and what he has to say to the occasion, as near at least as his text will permit.

Beyond that I will not go, however, for I was told in advance of what I should talk to you, and I have made preparation accordingly. When the invitation was extended to me, I asked Doctor Lewis with what I should attempt to interest a lot of doctors, and he suggested that I regard you as health officers — not mere physicians — and talk to you about your work, powers and duties, and the proper means of accomplishing results, from the lawyer's point of view. So I am here loaded with all sorts and kinds of dry legal notions, quibbles and principles, sandwiched with such ideas and legal information as I have tried to imagine enthusiastic and conscientious workers like yourselves in positions of vast public importance would be likely to attempt or desire to extract from the counseling lawyer.

The office of health officer is bred of the law, and its parentage is not of the common law nor traceable to old statutes. It has had a legal existence of scarcely a generation, and came into being legislatively, at a time when a cleanly civilization, and the fastidious ideas of the modern citizen of value, forced upon our lawmakers the proper consideration of the public health. Laws of this kind under which you now exist and labor in the interest of the public good find no counterpart nor even pioneer suggestion in the colonial or early legislation of this state.

For his creation, his term of official existence, a definition of his official powers and duties, and for all that pertains to his work, the health officer must depend upon the statute, and the construction thereof given by our courts in various decisions. In all his righteous crusades in the interests of the public health and his continuous struggles for the abatement of nuisances, he must depend mainly upon law, and be guided and controlled, at all times, by legal principles and rules, well fixed and established.

While of necessity a physician, yet the responsibilities and duties of his office more closely connect him with the provision of the law than that of medicine, for in addition to the equipment of a mind alert to duty, and yet not over-zealous, and a habit of using good common sense, all of which, of course, all good physicians have and must possess, he needs a careful knowledge and official conception in a general sense of the law under which he labors, and a due appreciation of his legal status, his importance and powers under the law.

It is, of course, impossible, within the limits of an ordinary paper, to cover the ground, even generally, so that the health officer may, with confidence hereafter tread the narrow path of legality. If I could do this, and I disclaim any such purpose, it would make, to some extent, useless and unnecessary the function of one upon whom you must and ought to continually rely in the performance of your official duties — the local attorney for the Board of Health. If I can say enough to convince you of the importance of frequently and fully advising with that officer and freely placing some of your responsibility upon him, by following his advice upon all questions into which doubt, under the law, shall enter, I shall achieve a result of sufficient value.

I shall assume upon your part a knowledge of the statute under which you exist and act and shall only undertake to refer to some of the questions which have been or must be solved through the aid of the law and the courts, to the end that you may avoid some of the legal pitfalls which have embarrassed or proved disastrous to others.

ELIGIBILITY

At the outset, the eligibility of the candidate for health officer must be determined, and in considering this question two things suggest themselves.

First — By the statute (sec. 20) he may not be a member of the board of health itself. This restriction does not, however, in terms relate to the health officer of towns — only in cities and villages. The courts have, however, in certain instances where the statute was silent decided that two given offices may not be held by the same person, by reason of "legal incompatibility."

No case deciding this question with respect to health officers of towns has yet been decided, yet the principle seems to be recognized that incompatibility exists when the public officer in one of his official capacities becomes authorized to pass upon the question of the amount of his charges or audit his claims for services in another capacity. Applying this principle, it is at least safe to suggest that even in towns the health officer should not be a member of the board of health. (People ex rel. Earwicker v. Dillion, 36 A. D., 539 [1890].)

Second — The health officer must reside in the municipality "for which he shall be chosen * * * or within which his official functions are required to be exercised." (Sec. 3, Public Officers Law.)

This question arose and was settled in a recent case where the right of a person who had been appointed health officer, but who did not reside within the town for which he was appointed to hold his office, was challenged.

EXISTENCE OF VACANCY

The validity of his appointment in one instance depended upon whether a vacancy existed. He should be appointed annually, and it appeared the board of health had failed to elect a successor upon the expiration of the present health officer's term, and that he was therefore holding over as provided in the public officers law. The county judge made an order appointing another person health officer, and it was held that the provision of the statute (sec. 20) giving the county judge power to fill certain vacancies did not give him the right to fill the office of health officer, where one was holding over, no successor having been elected or appointed, the idea being that only the board of health could act in such a case. (People ex rel. Gray v. Scott, 31 Misc., 131 [1900].)

While a trifle illogical, I might at this point answer one of many inquiries recently propounded. Is it mandatory for village trustees to appoint members of a village board of health. Section 20 of the public health law provides that a village health board shall be appointed at the first meeting of the board of trustees after the annual election. This undoubtedly means that the trustees shall appoint, and is clearly mandatory. Compliance with the law may be compelled by mandamus under section 31 of the health law, at the suit of any resident citizen, or the vacancy may be filled by the county judge in the manner provided by section 30 of the public health law, or the commissioners may, under section 11, exercise the powers and functions of a local board.

STATUS AND AUTHORITY

He is the chief executive officer of the board of health. His duties and powers must be prescribed by said board and from it he must receive directions in the performance of his duties. (Section 21.)

No official power or duty is therefore vested in or imposed upon the health officer except as derived from or delegated by the local board, through its prescription of his duties and directions relating to his work.

In a case recently decided in Indiana where the health statute is very similar to ours, an attempt was made to charge a municipality with an indebtedness incurred by the health officer in hiring help to drain a stagnant pool of water which had become a public nuisance. It appeared that the board of health had taken no action whatever with reference to the alleged nuisance, although presumably the health officer acted within what he honestly regarded his official duty. The outcome of the case was that the town was held not liable, in consequence of which the alth officer, of course, became personally responsible. The urt said although the statute makes the health officer the ecutive officer of the board, it does not give him the powers the ard itself has. If he has all the powers of the board itself, en the board is a useless body, and the only necessity for its stence is to elect a health officer each year. * * * The tute only means that the health officer shall carry out such lers and regulations as the board may make. If he had the wer to do the act in question here, he may do any act without thority from the board of health. Whether in a given case emergency might arise justifying immediate action by the lth officer is not presented.

If a nuisance is to be abated, that fact must be determined the board of health, not by the health officer. (Martin v. B. H., N. D. Rep., 998 [App. Ct., Ind., 1901].)

In a recent case in the highest court in Pennsylvania, an effort s made to punish an alleged offender criminally for disregardg an order made by the health officer. It appeared that this der was made pursuant to a general resolution of the board recting the health officer to abate all nuisances discovered thin the township, although the board itself made no order specting the particular case. The effort to punish failed, it ing held that the health officer exceeded his powers and acted ithout authority; that without formal action of the board itself, recting a nuisance to be abated, its health officer can neither eak nor act for it. (Commonwealth v. Yost, 197 Pa. St., 171.)

What action an emergency might authorize in the absence of tion upon the part of the board itself and instructions given, a serious question. The emergency at least should be a grave ie, and the health officer should only act after fully counseling ith the attorney for the board.

Respecting the question in a California case, the court said at the health officer "should be clothed with sufficient authory to enable him to deal with conditions affecting the public alth and to meet emergencies in a prompt and effective manr, and he will be upheld in the exercise of a wide discretion to at end, but in the absence of suitable rules or authority on the subject, if the executive officer of the board is left to adopt such measures as he deems suitable for the occasion, his acts are certainly open to judicial review, and to be sustained they must respect the constitutional rights of individuals, be uniform and reasonable and adapted to secure the object in view." (Wong Wai v. Williamson, 103 Fed. Rep., 1.)

Now, of course, I do not intend it to be understood from the authorities referred to, and what I have said in this connection, that a health officer has no live authority and can take no action with reference to a particular matter, with safety, unless or until he has received specific directions and orders with reference thereto from the board of health. There are many things which he may lawfully do upon occasions requiring the same under and by virtue of general resolutions previously enacted by the board. For illustration, a board of health may, by general resolution, prescribe the duties and powers of the health officer, and may authorize and direct him generally to act diligently and promptly in the matter of establishing a quarantine in the event of pestilence or the prevalence of infectious or contagious diseases and probably may vest him generally with sufficient power in such an event as would permit under section 24, of the obtaining control of such conditions and the proper isolation of infected persons and things.

He should, however, when acting in compliance with such general authority, promptly report what he has done to the board. The statute nowhere authorizes the health officer of his own motion to act, but in every instance provides that it, the board of health, shall do, or cause the cessation of the things mentioned.

When it comes to the abatement of nuisances, without doubt, the health officer, under general authority conferred, and without specific directions from the board itself, may act upon complaints filed by the inspecting of the place and by the preparation and service of a notice to the offender to abate, etc. If, however, such notice is not complied with, then the matter should be turned over to the board for further action, for the reason that it then becomes necessary for the board to adjudicate and determine as to the existence of a nuisance, whether the case be something in violation of a general regulation or a condition to be covered only by a special rule, and what is also equally important to determine as to whom the real offender liable to prosecution may be. I believe it may also be added that after the nuisance has been adjudged to exist, a board of health should, for the safety of the health officer, in general terms at least, give direction concerning the manner of abatement.

VALIDITY OF ORDERS AND REGULATIONS OF BOARD

Inasmuch as the orders and regulations of the board of health constitute the sole protection of the health officer in the performance of his work, questions affecting their validity should be of interest to him and be well understood. He should have some knowledge of what is requisite and necessary to accomplish a result.

For illustration, it was recently held in this state that an order made by a town board of health at a meeting of the board which was not attended by the citizen member, he not having been notified that the meeting was to be held, is invalid and constitutes no protection whatever to the health officer assuming to enforce the same. (Schoepflin v. Calkins, 5 Misc., 159.)

The statute provides that what are termed general orders and regulations shall not only be made by the board of health, but shall be *published.* The obvious purpose of this provision is that the public may have knowledge by appropriate publication of what laws the board of health have seen fit to make.

In a case decided some years ago, a person was prosecuted criminally for violation of a general provision of the board of health. It did not appear that the regulation had been published in accordance with the statute, and it was held that the alleged offender could not be prosecuted for that reason. (Reed v. People, 1 Park. C. R., 461.)

By the term "publish" I take it is imposed the necessity, before attempting enforcement, of giving publicity to its enactments through the newspapers of the municipality or by other appropriate means.

This does not apply, however, to such orders and regulations as the board may make in special or individual cases. These need not be published, yet the person to whom they are intended to apply must have served upon him "copies thereof" or have knowledge of the same.

This was held in the case of Gould v. The City of Rochester, 105 N. Y., 52.

Indeed, in a case decided in this state in 1897, the failure of the board of health making such a special order to furnish the owner "with a written statement of the results and conclusions" arrived at, it was decided, made the action of the latter a nullity, and afforded no protection to the health officer. (People ex rel. Govers v. New Rochelle, 17 A. D., 604.)

The jurisdictional effect or extent of an order or regulation of a board of health is often an interesting question.

In a Massachusetts case it was recently held that where a nuisance is maintained on land which lies in two adjoining townships, an order of the board of health in one town must be limited in its scope and effect to that town. (Gloucester Water Supply Co. v. City, 60 N. E. Rep., 976.)

And this rule is not in conflict with the law of this state. Several years ago a question arose respecting a nuisance caused by the city of Rochester by flowing its sewage upon lands in an adjoining township, and the Court of Appeals in that case held that while a board of health might not go outside of its jurisdiction, that is, the municipality where located, to enforce its ordinances (as for instance to interfere with the sewers of an adjoining town) yet it might very properly, by injunction, restrain the violation of an order made by it and in this manner enforce the abatement of a nuisance, although the actual cause thereof arose in an adjoining municipality. (Gould v. City of Rochester, 105 N. Y., 46.)

In the Rochester case last referred to, an old decision, reported in the criminal reports of this state, was referred to, in which it was held that service of notice upon a non-resident out of the jurisdiction of the board, although he owned the premises therein upon which the nuisance existed, followed mere omission to act thereunder, would not render him le to criminal prosecution. (Reed v. People, 1 Parker's G. 181.)

POWERS OF LOCAL BOARDS—ILLUSTRATIONS, ETC.

ı this connection two interesting and practical inquiries e suggested themselves: 1st. As to the enforcibility of an nance requiring inspection and licensing of dairies supply milk within the municipality, as against dairies located ıout the jurisdiction of the board of health; 2d. The right xact a fee for such inspection and license.

he first question is easily answered by the application of rules of law already referred to. Generally speaking, no ›r of a local board of health has any extra-territorial effect. application and enforcibility must be determined and circıscribed by the boundaries of the city, town or village ›rein the board of health enacting it is located. To enlarge authority would result in conflict between different municities which might render useless much designed for the good the public health. To go beyond the question, however, hin the doctrine of the Gould case, the health authorities of district subject to the ordinance, providing it in terms ›ade the sale of milk from uninspected dairies, probably ht, by injunction restrain dealers without from making ›s within unless properly licensed, after due inspection; alugh under other cases to be referred to, it might devolve n the health officer to show that the product sold by the ler in question was impure or otherwise a menace to the lic health.

o it appears that this branch of the subject is somewhat in›ed. It might be suggested, however, that the enactment of eneral statute covering the ground, and applicable to all lers alike, would dispose of all difficulty.

'pon the other question—as to the right to impose a fee—haps the less said the better. However, the right of the ıl authorities to make laws and regulations, and moreover exact fees and charge for their application, must be found :he authority conferred by the legislature.

The statute under which you labor is comprehensive, and as some one has said, permits almost anything dictated by good judgment; yet so far as I can find, neither it nor any other authorize the exaction of a fee or license charge by a board of health for the purposes referred to.

A regulation adopted by a city board of health requiring vendors of milk to register annually with its clerk, is a reasonable and proper order and enforcible even as against an honorably discharged soldier having a statutory license to peddle in all parts of the state. (City of Gloversville v. Enos, 35 Misc., 734.)

Orders and regulations respecting the keeping of cows, swine and other livestock within certain prescribed distances from occupied dwellings, are common and very properly made, yet in a recent case such an ordinance forbidding the keeping of cows within two hundred feet of a dwelling *without a special permit from the board of health,* was held to be invalid and of no protection to the health officer, for the reason that the board of health had no legal power to license the doing of an act, by a special permit, which in certain instances it had seen fit to prohibit by a law. (Village of Flushing v. Carrahar, 87 Hun, 63.)

The health officer when he undertakes to punish the violation of an order by the collection of a penalty imposed therefor, should in the first instance see to it that the exact amount of the penalty is fixed by the order, for the Supreme Court of this state has determined that an order making provision for a penalty by language, viz.: *"not exceeding"* a certain amount, will not permit the recovery of any amount whatever, and that the order must fix a definite and ascertained amount, applicable alike to all violators. (McNall v. Koles, 61 Hun, 321.)

In all instances where the validity of an order or regulation is questioned, one test should be applied. Is it fairly within the contemplation of the health law? No board of health possesses legal power to enact any order or regulation which shall be valid and enforcible, unless it can be said, after an examination of the provisions of the health law that the subject-matter, or the thing forbidden, or determined to be a nuisance, is properly within the jurisdiction of the board of health.

The question has frequently arisen, for illustration, as to the right of the board of health to enact an order requiring the muzzling of all dogs during certain periods of the year and authorizing the killing of those found unmuzzled. The purpose in view is, of course, the supposed prevention of hydrophobia. If such an order could be made practically applicable only to such dogs as were diseased, or sure to become so, it might possess validity. Yet, speaking seriously, no matter how often we may occasionally feel to the contrary, a dog is not of itself a legal nuisance. On the other hand it is much to-day a species of property belonging to the owner as a horse or any other animal, and the enactment of such a regulation, which in no sense is contemplated by the provision of the health law, would constitute but an awkward and illegal means of depriving the owner of an unmuzzled dog of his property without due process of law.

Undoubtedly the board of health would possess the same power to destroy or restrain or confine animals other than dogs suffering from hydrophobia or other contagious and infectious diseases, but such power being granted, it could not be extended so as to permit the destruction of those not diseased or infected, not confined or restrained.

The vice of such an ordinance is the killing provision. If the emergency were great enough, caused by an epidemic, for instance, an ordinance regulating muzzling, etc., and punishing violations with a money penalty, might be enforcible.

In Massachusetts the legislature passed a statute authorizing the killing of unlicensed or unmuzzled dogs, declaring such to be a nuisance, and such statute has been held to be constitutional. No such law, however, exists in this state. (Blair v. Forehand, 100 Mass., 136.)

Again, there is no statute nor rule of law which confers upon the board of health the right to permit one citizen to create and maintain a nuisance to the injury or detriment of another. In a recent case, the owner of property upon the banks of a stream sued one located above him for damages, and to prevent the discharge of sewage into the same. The defendant was a hotel-keeper, and asserted, among other things, that he was compelled to drain into this stream, having no other place for the discharge of his sewage, the board of health having forbidden him from maintaining a cesspool therefor, etc. It was held that his defense was no answer to the claim of the suing party, within the rule just stated. (Mann v. Willey, 51 A. D., 169 [1900].)

Very frequently, in an effort to abate nuisances caused by cesspools and the like, the offender will take the position that it is a defense to the proceedings and action of the health board if he show that the city or municipality has afforded him no other means of disposing of his sewage. This question, however, was recently passed upon by the Court of Appeals of Missouri, where it was held that the fact that a town has no public sewers is no defense to a prosecution by the board of health for the failure to abate a nuisance caused by the draining the sewers into the street, until at least, it appears that no other reasonable means of disposing of the sewage can be properly devised. (Town of Kirkwood v. Cairns, 44 Mo. App., 88.)

The question of the right of the board of health to construct sewers at the expense of the municipality, in the event of its default, has occasionally arisen, and seems involved in considerable doubt, with the weight of opinion against such authority.

In one case it was recently held that the power of the board of health over sewers, in view of the present provisions of the health law, is recommendatory merely. (Re Kent, 60 N. Y. Supp., 627.)

The provisions referred to are those contained in section 21. which permit the local board, whenever it shall deem the sewers of the village insufficient, etc., to certify the fact to the board of trustees, and providing that thereupon said board must act, together with the further provision contained in section 31 of the health law, which provides for the enforcing of performance of any duty under the health law by mandamus at the instance of the local board or any citizen, etc.

In another recent case a reference to the subject was made by e court in saying that a board of health in abating a nuisance ay not enter upon the construction of important permanent nprovements upon a scale bringing them within the definition public works, the court making reference to the same proisions of the health law already referred to, as sufficient for s proper and necessary purposes. (Hoag v. City of Mt Vernon, 1 App. Div., 366; see, also, upon this subject, People v. New ochelle, 17 A. D., 603.)

The Mount Vernon case, just referred to, illustrates the diffi- lty of being obliged to deal with the case of a nuisance affect- g the general public, arising on account of swamp lands. I nfess that I find myself at this time inadequate to advise early as to the course to be pursued for the abatement of a uisance existing because of a swamp *which is the result of tural causes.* The provisions of law seem inadequate, and I can ly offer the suggestion that situations of this sort can be best et and dealt with through the medium of a special act of the gislature, providing for specific abatement of the nuisance, rough authorities to be named, and the proper subsequent dis- ibution of the expense upon the taxpayers of the municipality.

The question has been recently asked, and I will therefore fer to it at this time—"Under the law should not the plans r public sewers in villages and towns be submitted to, and ceive the approval of, the State Department of Health, before nsideration?" Section 260 of the village law makes specific rovision that, before taking any proceeding in a village for the nstruction of a sewer, the plans and maps therefor shall be ubmitted to the State Department of Health for its approval, tc. A similar provision, respecting the construction of sewers towns, is contained in section 4 of chapter 348 of the Laws 1901.

The question as to the power of the authorities to destroy or move buildings or structures dangerous to the public, for dif- rent causes, or to prevent their further occupation, frequently rises.

The best elementary writers lay down the principle, and adjudications for centuries have sustained and sanctioned and upheld it, that in a case of the ravages of a pestilence or any other great public calamity, the private property of any individual may be lawfully destroyed for the relief, protection or safety of the many, without subjecting the actors to personal responsibility for the damages sustained, except as created by statute. (Young v. Flower, 5 Misc., 37; Mayor v. Lord, 17 Wend., 283.)

In a recent case, an order of the board of health providing for the destruction of a portion of a building which was unfit for human habitation, and which endangered the health of adjacent occupants, and which provided for the removal from a part of the building of the tenants and occupants because of unsanitary conditions, was decided valid. (Egan v. Health Department, 9 A. D., 431; 20 Misc., 38; see, also, Colden v. Health Department, 21 A. D., 480 [1897].)

In 1899 a case was decided by our Supreme Court, which arose in the city of Olean, having reference to this subject. By reason of a fire, it appeared that the third story of a building had become a nuisance and was dangerous to the lives of pedestrians traveling upon the sidewalk and adjacent thereto. The board of health under a special order removed that part of the building which was dangerous, and while the court held that the burden of proof was upon the board to show, when its action was called in question, that the condition of the building was dangerous to the public and therefore a nuisance, that having shown that fact, its action should be sustained. (Smith v. Irish, 37 A. D., 220.)

The question occasionally arises as to the power of the local board of health to enforce compliance with the law as to the filing of birth, marriage and death certificates. Section 29 of the health law imposes a mandatory duty upon physicians to file certificates of birth, and upon clergymen to file certificates of marriage, in the manner therein provided, while section 28 forbids the burial of a deceased person until a burial permit has been procured, by the filing with the local board of health of a certificate setting forth the probable cause of death. The latter certificate must and can be furnished only by the physician or coroner in attendance upon the deceased upon his last illness, and if no physician was in attendance, an affidavit must be filed, made by some creditable person, showing the time and cause of death.

. These are plain, positive provisions of law, and when the following section of the penal code is taken into consideration, no difficulty would appear to exist respecting their enforcement.

Section 397 of the penal code provides that any person who wilfully violates any provision of the health laws, or who omits to comply with or violates any lawful order or regulation prescribed by any board of health or health officer, is punishable by imprisonment not exceeding one year or by a fine not exceeding two thousand dollars ($2,000), or both.

ENFORCEMENT

It may be stated at the outset that the decisions of the courts in this state, upon first examination at any rate, are somewhat confusing respecting the proper manner of enforcement of ordinances, etc., and the necessity for the giving of notice or notices to the party to be moved against, and the affording him an opportunity for a hearing before the board respecting the alleged nuisance.

It has been asserted in recent cases that the board of health was not obliged to hear anybody, and that in abating a nuisance it could act upon its own inspection and knowledge of the premises; that the party complained of was not entitled to a hearing or notice. (Cartwright v. City of Cohoes, A. D., 73; affirmed, 165 N. Y., 631; People ex rel. Copcutt v. B. of H., 140 N. Y., 6, 7, 10.)

While, in another line of cases, the courts seem to have determined that notice and hearing were both proper and necessary. (People v. Board of Health, 33 Barb., 344; Schoepflin v. Calkins, 5 Misc., 159; People v. Board of Health, 53 Hun, 505; People v. Wood, 62 Hun, 131.)

This apparent conflict of authority is confusing, and can be understood only after considerable examination.

The courts sometimes seem given to the expression of opinions which are best calculated to unsettle and disturb the minds of laymen. For illustration, in the first line of cases (those holding neither notice nor hearing to be necessary), notably the Copcutt case, which arose in Yonkers, the Court of Appeals makes its statement that neither hearing nor notice are necessary apparently in the light of the abstract proposition that "boards of health under the law cannot, as to any existing state of facts, by their determination, make that a nuisance which is not in fact a nuisance; that they have no jurisdiction to make any order or ordinance abating an alleged nuisance unless there be in fact a nuisance. It is the actual existence of a nuisance which gives them jurisdiction to act." Now this doctrine is all right, but the difficulty with it is that it presupposes that neither boards of health nor health officers will ever err in judgment.

In fact, as if to make the subject more perplexing, the court suggests that the health officer, acting under the orders of the board in abating a supposed nuisance, is protected while engaged in the performance of the duty thus imposed, yet in view of the rule that a nuisance must actually and in fact exist, says: "All persons acting under their authority in abating the alleged nuisance, act at their peril. * * * They should not destroy property as a nuisance unless they know it to be such, and if there be doubt as to whether it be a nuisance or not, the board *should proceed by action* to restrain or abate the nuisance." Thus calling for the adoption of a long and tedious remedy. (Copcutt Case, 140 N. Y., pp. 6, 7, 8 & 10.)

So it amounts to this, that while in abating a nuisance, you need not afford notice or hearing to the party moved against, and are protected while you are acting (whatever that may mean), yet you act at your peril, and if it should be determined subsequently by a court that either you or the board of health have erred in your judgment as to the existence of the nuisance, then you become personally liable for your acts, which are those constituting a wrong.

Indeed, simply stated, the rule in the Copcutt case is: If it turns out that a nuisance actually existed and you pursued a legal course, then notice and hearing were unnecessary; but if it transpires otherwise, in view of your legal peril, you would have been much better off had you afforded the party proceeded against due notice and full opportunity to be heard. To use slang, "it is up to you" every time. For nothing you may do is binding and conclusive on the alleged offender under the decisions. If he believes himself aggrieved he may go into a court of equity to restrain you from doing anything; he may sue you for his damages for interfering with his property and rights; he may defend himself in the courts when you try to collect penalties from him or to have him punished as a criminal; and in every instance you must justify the legality and right of your actions.

For it has been held by the courts of highest resort in this and other states that "where property of an individual is to be condemned and abated as a nuisance, it must be that somewhere between the institution of the proceedings and the final result, the owner shall be heard *in the courts* upon that question, or else that he shall have an opportunity when calling upon those who destroyed his property, to show that the alleged nuisance was not one in fact. No decision of a board of health, even if made on a hearing, can conclude the owner upon the question of whether a nuisance actually existed or not. (Health Department v. Rochester, 145 N. Y., 48 [Trinity Church case]; 8 Copcutt cases, 140 N. Y., pp. 1-12; Hiller v. Horton, 152 Mass., 540; Hilton v. City of Camden, 35, 50 N. J. L., 123.)

To refer again to the decision under discussion, the court said: "The question may be asked, how can these provisions conferring powers upon boards of health to interfere with and destroy property, and to impose penalties and create crimes, stand with the constitution securing to every person due process of law before his property or personal rights or liberty can be interfered with? The answer must be that they could not stand if we were obliged to hold that the acts referred to made the determinations of the board of health as to the existence of nuisances final and conclusive upon the owners of the premises whereon they are alleged to exist. Before such a final and conclusive determination could be made, resulting in the destruction of property, the imposition of penalties and criminal punishments, the party proceeded against *must have a hearing, not as a matter of favor but as a matter of right,* and the right to a hearing must be found in the acts.

"The result of these authorities is that whoever abates an alleged nuisance and thus destroys or injures private property, or interferes with private rights, whether he be a public officer or a private person, unless he acts under the judgment or order of a court having jurisdiction, does it at his peril, and when his act is challenged in the regular judicial tribunals it must appear that the thing abated was in fact a nuisance. This rule has the sanction of public policy and is founded upon fundamental constitutional principles."

It probably has by this time occurred to many of you that the statement of the law already made in this connection, particularly as relates to the question of peril, affords none too encouraging an outlook to the vigilant health officer. Like all lawyers, as well as laymen, I am, however, obliged to deal with the law as I find it. I do not, however, believe that you should properly regard what I have said in this connection as an excuse for acting only in the most serious of cases, or for not acting at all. You should understand in connection with the references to the law already made, that when you act there is a certain sort of a presumption in your favor which exists as to all public officers, that you have acted in good faith, with authority and within legal bounds. Moreover, if conscientious and diligent in your work, the question of peril will trouble you but little if you act with caution, always ready to apply the old maxim "Be sure you are right, then go ahead."

Different ways exist for the enforcement of orders, and for the punishment of violations. For illustration, the health officer may proceed to punish the offender criminally for violation of the ordinance.

Under the case of The People v. Wood, 68 Hun, 131, it must appear that the defendant had notice of the findings of the board of health determining him to be the owner of the property and responsible for the nuisance and must have been given an opportunity by said board to be heard before it.

Or the board may sue the alleged offender to recover a fixed penalty for the violation, and in such an instance, from the holding in the Wood case just mentioned, undoubtedly notice and an opportunity to be heard must have necessarily been afforded the defendant.

And in the case where the action of the board of health necessarily would result in a substantial impairing of the property rights of an individual, notice, etc., was held necessary. People v. Board of Health, 58 Hun, 595.)

Of a certainty it would seem, where the alleged nuisance was such as called for the enactment of a special order or regulation, as for illustration, one declaring a particular business, trade or occupation a nuisance, and not covered by the general regulation, the party proceeded against is entitled to notice and an opportunity to be heard in his defense by the board. (People v. Board of Health, 33 Barb., 344; Schoepflin v. Calkin, 5 Misc., 159.)

But where the health officer only proposes to properly abate the nuisance and under the law charge the expense thereof upon the property, notice and hearing are not necessary under the later cases, although he acts at his peril. But even here the final order of the board decreeing a nuisance and directing its abatement must have been served or posted according to law. (Sec. 26, public health law; Wood case, 63 Hun, 136.)

After much examination of these questions and considerable experience, I am constrained to be of the opinion that by far the safer and wiser course to pursue in each instance is for the board of health, or rather, the health officer, who is the one who acts at his peril, to see to it the party moved against has reasonable notice and opportunity to be heard.

Certainly the peril referred to by the Court of Appeals is much less.

I desire, therefore, to suggest a few rules easily followed, and which, if generally pursued by the thoughtful health officer, will be likely to result in the saving of much trouble and anxiety.

First — Examine the premises or place where the alleged nuisance exists, and if you find a danger to the public health exists, then comply with section 25, public health law, by giving:

First — Personal notice in writing to the offending party, calling attention to the regulation violated, and stating the results and conclusions of your examination, and, requiring the abatement of the said nuisance within a specified time. This notice should be given and served pursuant to a resolution of the board of health, which resolution I believe may be a general one.

Second — In the event of failure to comply, a resolution should be passed by the board ordering the offender to be cited by the health officer before the board on a day certain, to show cause why the condition alleged to be a nuisance should not be declared a nuisance detrimental to the public health, and its abatement ordered.

Third — Personal service of a certified copy of such a resolution with due notice of the time and place of the hearing thereunder should be served on the offender.

Fourth — A hearing should then be had pursuant to said notice, at a meeting of the board duly called. A finding of the existence of a nuisance should not be made without proof, even though the offender defaults in appearance. If he appears he should be afforded an opportunity to be heard personally and by witnesses. The health officer and other necessary witnesses should be sworn, and the board itself may even personally examine the place, in order to determine as to the existence of the nuisance. The finding of the board at the conclusion of the hearing should be in the form of a resolution reciting the provisions of its regulation violated, the proceedings in the case, and should in terms adjudge the existence of the nuisance, and direct the health officer to notify the offender of its adoption, and it should state that compliance was required therewith by the abatement of the nuisance within a certain number of days, and at in the event of failure, the health officer would enter upon e premises and abate the nuisance and proceed to sue for the covery of penalties and prosecute the offender criminally.

Fifth—A copy of such resolution with notice of its adoption ould be personally served upon the offender.

Sixth—In the event of non-compliance the health officer ould act with diligence, committing no needless destruction or injury to property, but solely to the end that the con tion existing should be changed so as to no longer constitute nuisance. And I know of no better rule for his guidance in is respect than is stated in an old case, viz.:

The power given by statute to abate nuisances is not an un stricted power. Such means only may be adopted as will ork for the public good. The acts of abatement must be mited by necessity and no wanton or unnecessary injury to operty or the rights of individuals must be committed. (Bab ck v. City of Buffalo, 56 N. Y., 368.)

Yet you must keep in mind what was also stated in the lmost famous case of Eckhart v. City of Buffalo, 19 A. D., 6 here the health officer contended that he had authority to tear at water-closets which were nuisances, and replace them with odern sanitary plumbing, etc., "it must necessarily be left to he discretion of the health authorities, and their acts will not e judicially interfered with unless manifestly unreasonable and ppressive or unwarrantably invading private rights."

The right to abate a nuisance, however, is limited to the power f removal. The health officer may require an abatement and ay prescribe the particular mode of abating it providing that e the most effectual way, but he possesses no absolute power in hat regard, and it does not follow that he may direct important lterations or make permanent improvements at a large expense o the owner which are not demanded by the actual necessities f the case, and it was therefore held that the construction of omething new, in lieu of the thing creating the nuisance, was ot authorized. (Eckhart v. City of Buffalo, 19 A. D., 6.)

Where I have suggested the personal service of notice, etc., pon the alleged offender I might perhaps add that if such course prove impossible, service by mail or by posting on the property would doubtless be sufficient.

Where no general order or regulation exists applicable and a special order becomes necessary, it could be adopted and enforced only upon notice and after hearing afforded the offender in the manner already suggested.

These suggestions may seem to point out a course unnecessarily technical and accurate, and in many instances their application might justify this belief, in wherever the condition is a serious one, and the consequent responsibility of the health officer of any considerable extent, a much safer course to pursue is that indicated.

An interesting phase of the subject is presented in a recent case decided by our Court of Appeals. It appeared that Smith had refused to comply with an order of the board of health directing that he be vaccinated. He had thereupon been isolated and placed in quarantine. The order for vaccination and his subsequent quarantine were based upon the health law, section 24, relating to contagious and infectious diseases and exposure thereto.

The Court of Appeals held that the term "exposure" means the actual fact of exposure, and not the mere possibility, and that Smith's refusal to comply with the order and be vaccinated, did not justify his detention and quarantine unless he had been *actually exposed or infected with smallpox.* In that case the court held that the health officer must show, and in all instances if called upon to do so, is bound to show the state of facts to be such as legally justified a previous exercise of his powers. In other words, that he was bound to justify his act in shutting Smith up, by showing actual exposure or infection. (Matter of Smith, 146 N. Y., 68.)

Indeed this the health officer was later invited and called upon to do in the courts, in an action brought against him by Smith for damages for false imprisonment. (Smith v. Emery, 11 A. D., 10.)

The question has arisen frequently in this state of late as to what are proper expenses of quarantine to be borne by the municipality.

rally speaking this subject, however considered, should ced at in the light of principle that a quarantine is arily established and maintained for the benefit, not of ·ties infected, but the public good, and that therefore all ry charges and expenses, such as care, nursing, medicine, nishing of guards and possibly even the employment of a lar physician to take charge of the contagious disease quarantine, should be properly charged to the munici- where the patient is cared for in confinement elsewhere his own home or a place of his selection.

owever, the confinement is incidental to the patient's con- it, or where he is ill at his own home, and he is financially seems he should pay his and all other expenses except relate particularly to quarantine, such as guards, or pos- roperty destroyed, etc.

owa it was recently held that the municipality is liable oper expense of quarantine, where the same is maintained public protection and a person is quarantined in a fam- r board of family and for clothing and property destroyed. f Clinton v. Clinton County, 61 Iowa, 205.)

powers of the health officer in enforcing quarantine are in section 24 of the health law. It is there provided that ard "shall require isolation, etc., and shall prohibit and t intercourse and communication with" the place of in- . Upon the making of appropriate orders and regulations ing the subject, it devolves upon the health officer to the same, and he can, of course, call to his aid the power law as contained in sections 396 and 397 of the penal code, r mentioned, making all violations of such orders criminal s.

WHO TO PROCEED AGAINST

often a perplexing question which confronts the vigilant officer as to whom to proceed against where the property which the alleged nuisance is located is in the possession of pied by one other than the owner. The subject has, how- een before the courts of this state in such a form and the have been such as to make it now a matter of little difficulty for him, providing he has due appreciation of the legal principle involved. It has been decided that the owner of leased premises, even though he is not in possession, is liable for the maintenance of a nuisance thereon where he receives the rent from the tenant with knowledge of the nuisance. This case, however, evidently proceeds upon the theory or assumes that by the terms of the lease there was reserved or remained in the landlord the power or capacity, in other words, the right to enter upon the premises for the purpose of abating the nuisance. (Board of Health v. Valentine, 32 St. Repr., 919.)

This rule, however, does not apply in a case where, by the terms and conditions of the lease, the property is beyond the control of the landlord.

For in a case decided as late as June of the present year it was held that where premises having a nuisance thereon have a tenant, the real test of liability therefor as between the landlord and tenant, is who is in control of the property, that is, who suffers the offensive condition to exist? In this case, the law violated was a provision of the New York city charter which in terms provided that where property was tenanted "the owner shall be *prima facie* the person liable for a nuisance, the tenant's liability to be subsequent, etc.", and yet the court held that the question of liability as between the landlord and tenant was still open to inquiry and that where the owner was not in full possession of his property and not responsible for its management or offensive condition, but the tenant rather the one in position to check the abuse and remedy the condition, the tenant should be held liable and not the owner. The court even said that whatever is the lessee's duty to the lessor in the premises also becomes his duty with respect to the public and the third person. (Department of Health v. Wendall, 33 Misc., 100; affirmed by A. D., June 21, '02; no opinion.)

REMEDIES

Of course, it is well for the health officer to remember that in the manner of the enforcement of the provisions of the law a the prosecution of his work, he is not confined to the remedi ıdy referred to. For illustration, where a condition has been ıred a nuisance and abated as such, the health officer may erly appeal to the courts for an injunction to restrain and ent a reconstruction or reinstatement of the offensive con-n.

where the erection or creation of some condition can be n to be certain to result in a nuisance which will menace ic health, the board of health may, by injunction, procured the courts, prevent an erection and creation of the condi- (Copcutt case No. 2, 140 N. Y., page 12.)

ıd upon the authority of the Copcutt case it perhaps ought e remarked that in those situations arising which seem to ent a condition involving a nuisance, and yet where it is pen or doubtful question as to whether a legal nuisance ally exists at all or not, the board of health or the health r if desirous of exercising great caution and the public gency will permit, might, with better advisability, proceed tly for the abatement of the nuisance by an application to ourt in the first instance for an equitable declaration from ourt that the thing or condition is a nuisance—its further inuance to be temporarily restrained by injunction until the rmination of the suit.

ocedure of this kind, by way of action in court and injunc- has nothing of a summary nature to recommend it, and by on of the well known "law's delays" should only be resorted hen other courses are unsafe or do not meet the situation.

WHAT ARE NUISANCES

lackstone says "a nuisance is that which worketh hurt, in-renience or damage."

the year 1860 this question was interestingly discussed by Supreme Court of this state, the court saying:

There are certain things which are nuisances *per se,* of which els, clothes and goods charged with effluvium and infection persons fatally diseased; also dead, decaying and putrid nal or vegetable matter are examples. They are nuisances hemselves. They affect the public health, and may be suppressed and removed without serious or permanent injury t the owners of them. Their presence in cities and populous plac may become the subject of municipal and sanitary regulatio There are certain things and employments which beco nuisances not from any inherent and intrinsic offensive qualiti of their own, but from matter extrinsic, such as the manner which those things are used, and the manner and the pla where the occupations and employments are conducted. Certa trades which are inoffensive in one place, may become nuisanc when carried on in another. Neither a dam thrown across stream of water, nor a collection of water in a reservoir creat thereby, is a nuisance *per se*. On the contrary, they are sourc of mechanical power, and tend to diffuse health and streng and comfort to large numbers of people. Reservoirs and coll tions of water by means of dams in the beds of running strea for the purposes of manufactures and supplying cities and tow with water for public and domestic uses, are to be found eve where throughout the state. They are ranked among the e dences of its cultivation and progress in the useful arts. T water thus collected cannot in itself become detrimental a dangerous to the health of the population in the vicinity witho other things combined, such as the presence of decayed a decaying vegetation, and its exposure in shallow basins to t evaporations of the summer heats. The question of nuisance no nuisance depends upon the presence or absence of the traneous facts and circumstances to which I have referre (Rogers v. Barker, 31 Barb., 447.)

In 1870 the question came before the Court of Appeals of t state, for decision as to whether dead hogs, a carload of wh had been suffocated in transit from Albany to New York, w to be considered nuisances *per se* and the health officer theref justified in their seizure and destruction. It was held that e dence showing that the animals died by suffocation and t animals so dying were sometimes taken to market and s for food did not afford a justification for the seizure of the sa in this instance by the health officer. The court said, respecti his powers:

"He would have to show that they were putrid or in some vay dangerous to public health, and when he had shown this hen he would have made a case calling for the exercise of his iscretion.

"In this case, the defendant should have shown that these ogs emitted an offensive odor, or that the plaintiff had abanoned or neglected or refused to take care of or remove them, r some fact tending to show that they were likely to become angerous to the public health. In the absence of any proof howing any of these facts, and while the plaintiff's agent was here ready and willing to take care of the hogs, there certainly vas nothing calling for the exercise of any judicial discretion nder the ordinance in question." (Underwood v. Green, 427 Y., 140.)

It has been held in New Jersey that where something exists vhich simply renders home uncomfortable or depreciates the alue of property, yet amounting only to a nuisance to indiiduals, that relief must be sought not through the medium of he public authorities but against the individual maintaining the ondition by the individual embarrassed thereby because the hing is not hazardous to the public health. (Board of Health . Boidt, 19 Atlantic Repr., 318.)

It was also held in the same state that a tannery is not *er se* a nuisance. (Marshall v. Cadwalder, 36 N. J., 283.)

Also that fat rendering is not necessarily a nuisance, but that vhere odors produce sickness of stomach, loss of appetite, and ompel the closing of doors and windows, day and night, interering with enjoyment of sleep and meals, that the business as un is a nuisance. (Board of Health v. Lederer, 52 N. J., Eq., 75; Weil v. Schultz, 33 How. Pr., 7.)

I see no reason why an unsanitary and unhealthful condition, aused by refuse from the creameries and cheese factories, hould not be treated and regarded the same as any other uisance, and such institution compelled to provide means for sanitary disposal of their refuse.

I have thus briefly alluded to this branch of the subject for the purpose of showing that some things are always necessarily nuisances, while others may or may not be, the fact to be determined by location, manner of use or occupation.

COMPENSATION

I now reach a phase of my subject which is always of interest to the professional men. The decisions of the courts of this state with reference to this topic are few in number.

In 1896, in a case arising in the village of Penn Yan, a health officer rendered certain services in his capacity as a physician and surgeon, in connection with a smallpox epidemic. His bill as presented therefor made no reference to the fact that he acted in his official capacity as health officer, and it was accordingly held that he could only recover the actual value of such services, and not the amount which had been approved of by the board of health; that as the health officer did not make his claim in his official capacity, the bill was to be viewed as an ordinary claim against the village, to be audited by the trustees in the usual manner, at a reasonable amount. (People, Etc., v. Trustees Village of Tarrytown, 2 A. D., 29.)

In another case arising in 1896 in the city of Mount Vernon, an interesting question arose as to the right of a health officer, whose compensation had been fixed at a definite amount, to receive extra compensation. It appeared that an epidemic of smallpox broke out in the city. Under a resolution of the board of health the health officer was instructed to employ a special physician, at a stated compensation, to take charge of those afflicted with the disease. The health officer complied with the resolution, but the physician employed not proving satisfactory, he took charge of the case in person, and made a large number of visits to the patients at the places of isolation, for which he charged a certain amount per visit. After he had undertaken the care of these cases, the matter was brought to the attention of the board of health, whereupon the board, by resolution, authorized the health officer to attend to the cases himself. At the times in question the health officer was a member of the board and received a fixed salary of $75 per month for his services as health officer.

The court said: “The statute under which the board acted es not specifically define the duties of a health officer, but e nature of his employment and the purpose of the creation the office sufficiently designate the character of the duties hich he is to perform, and we think that such duties embrace cessarily the character of service which was rendered in this se.”

The appellate court went on to say that undoubtedly the ard had power to authorize the employment of other physi- ans and create a legal charge therefor against the city, but at the health officer himself could exact no extra compensa- on for the services which he rendered upon the basis that e service was extra-hazardous, and that all that the plaintiff d done he became bound to render for the municipality by rtue of his general employment, and that he could exact no tra compensation therefor. (Reynolds v. City of Mt. Vernon, A. D., 593; affirmed, 165 N. Y., 592.)

In a still later case, arising in the village of North Tarry- wn, the question of compensation of the health officer did t arise, but it was claimed that the board of health was not thorized to employ any special assistance or help until some gulation or order had been made by the board of health with ference to the condition to be investigated.

The court held that this construction of the powers and ties of the board of health was much too narrow, saying: It is required to execute the laws, suppress nuisances, and ake rules and regulations in connection therewith, but it is ite evident that, in order to discharge its duties in this con- ction, an examination and determination of the specific con- tions must be made before it could be established that a isance existed. The mere complaint of a nuisance would t have the effect of determining that a nuisance existed; ither would a declaration of the board of health establish a ven condition to be a nuisance when, in fact, it was not so. * * We think it would be quite within the power of the ard to make employment of persons when necessary to in- stigate, report and describe a given situation, in order that e board of health might act intelligently thereon.”

I have now, tediously enough, endeavored to give you some idea of the attitude of the courts with reference to some of the questions which may confront you in this work, and what I have said has necessarily been dry and devoid of the element of entertainment.

From the view-point of one of my profession, the health officer and the law are so closely connected, and such is the constant recurring relation of the law to your work, the frequent necessity for advice and counsel that you may decide as to just the right thing to be done as a matter of law, and secondly, as to the legal way in which to do it, that I believe no better suggestion can in conclusion be made, than one already mentioned—that you insist, if possible, as a condition of the acceptance by you of the position of health officer, upon the designation by the authorities of some responsible, experienced local attorney, upon whom you can at all times, through seeking and then following his advice, cast a part of the responsibility which attaches to a faithful execution of your duties.

I would not have you gain the impression from what I have said that the occupation of a health officer, from a lawyer's view-point, is one of continual hazard, and that, figuratively speaking, he takes his life in his hands on every occasion when he acts officially. Nor would I have you believe that his acts should be so far circumscribed with legal caution as to make of the office a cumbersome affair which can move only so slowly as to insure a lack of result or utter failure.

You will appreciate that it is only the cases which involve questions of doubt and disputes which possess two sides of substantial difference which reach the court for final arbitrament. And in my talk I have simply called your attention to instances which have been considered judicially, where the acts and the authority of the health officer or the board of health have either been seriously assailed or successfully overthrown. I have but pointed out some of the pitfalls and bogs which you may easily avoid. The main traveled road for your work is the statute itself; remarkable for its clearness, breadth and nprehensiveness, it is easily followed, for it affords a plain, ooth course for by far the greater majority of the cases with iich you may have to deal.

So I say, in conclusion, go ahead with your work fearlessly, not recklessly, confident that in most of the cases to be alt with a due adherence to the statute, coupled with sound lgment and common sense, will suffice, but still willing and sirous of seeking and accepting, and then following the legal vice of your attorney, when conditions arise, as there occanally will, which are of more serious import and which predie doubtful results.

Dr. Lewis—We owe Judge Warner a great debt for one of e most clear expositions of the public health law to which I ve ever had the pleasure of listening. Every topic which he s discussed has been one which you and I have had to deal th from day to day.

Judge Warner wished to have a proxy read his paper, he ing in the western part of the state yesterday morning. I nt word to him that I thought it would be essential for him come here and answer the queries which might be made garding his paper.

The paper is now before you for discussion.

Dr. Shattuck (of Westport)—I would like to ask Mr. Warner a little information upon one or two points. A question economy comes up in our board of health. We call our ard together at an expense of $12 or $15. They instructed that in case of a nuisance I should notify the party to ate that nuisance, and if he refuses to do it, then for me go ahead and prosecute him without calling the board tother again, or to cite that man before the board. I don't nt to get into any difficulty about that, because we had just ch a case. We had one this summer.

Another thing is: for the same reason the board has instructed to act upon any nuisance and report to the town clerk. I ieve we don't have to make this complaint in writing now. en the town clerk reports that to me and I go and see the party, d not notify them by letter to abate the nuisance. In this case he refused to do it; said I had no right to do it and he would see the law on the subject. I employed a constable and gave him a letter of instructions. I said, "Go there and take this man with you and stay there until that nuisance is abated." It was a case of a horse and cow that he had left, and the near neighbors made several complaints.

But this other case is a little more serious, and I don't want to get into trouble.

Mr. Warner—I have tried to make the matter plain. I don't want to frighten you with a discussion of this subject of peril, because, as I said in my talk, if you are sure a nuisance exists (and any officer ought to be able to determine in an ordinary case whether it does or not), and he understands how to handle the party committing it, he can get along without any help; but technically a health officer has no power to determine what is a nuisance. The statute says the board of health must do it, and I should say to you that if the board of health had passed a general resolution directing you to inspect and give notice to a man that he was maintaining a nuisance and should abate it, that you would have power to do that, under the general resolution.

Now we will suppose that you serve your notice upon some one who is maintaining a nuisance, notifying them that such and such a condition (describing it) is a violation of some regulation, and order it to be abated within so many days; if he does not do it, it then becomes necessary for somebody to adjudicate the thing to be a nuisance, and the only body or officers who can do that is the board of health. Under all these cases here the health officer has not the function to decide whether or not the thing is a nuisance. That belongs to the board of health. If he had that power, we might as well dispense with the board of health.

Dr. Shattuck—In that case the board did make it.

Mr. Warner—You remember the Pennsylvania case where the board of health passed a general resolution and appointed a health officer at the beginning of the year, authorizing him to abate any nuisance with which he might come in contact, the court held that that was like saying to the health officer, "You do our work and we will sit by."

Dr. Shattuck—He is the executive officer of the board.

Mr. Warner—Yes, but there are certain functions which belong to the board alone, which can not be safely delegated. Of course in the great majority of cases you can get along without calling the board together, but if you have an obstreperous individual to deal with, and there is a probability of a law suit, you had better refer it to the board.

Dr. Shattuck—Up there they have no idea that the health officer is better than anybody else. In regard to making a complaint up there, they report to the town clerk, don't make it in writing; and Mr. Taylor said in his remarks last year, in reply to a question, "Does the law require a signed affidavit in making a complaint?" that it did not.

Mr. Warner—I don't understand that the health officer must have any complaint. Of course complaints are usually filed. If I filed a complaint, it would be your duty to act upon it, and if you as health officer learned of a nuisance it would be your duty to go ahead and serve the notice.

Dr. Shattuck—Without any authority from the board?

Mr. Warner—Under the general authority conferred.

Dr. Howe—I would like to ask Judge Warner, in case of a cesspool polluting the drinking water of a well, where an analysis shows clearly the presence of colon bacilli, if the individual owning the cesspool is responsible to the damaged person?

Mr. Warner—You mean responsible to some one who contracts disease from drinking the water? Hasn't that question been in the courts?

Dr. Howe—I am not a lawyer. I am asking for information.

Mr. Warner—I have heard something about it.

Dr. Howe—I will cite the case. In our village we had an epidemic of typhoid fever, a local outbreak. There were five cases within a radius of perhaps one hundred yards, so closely centralized that my suspicion was directed to a certain well which was used in common by most of these families. An analysis of the water showed that it was filled with the colon bacillus and also with nitrous acid, and I went at once and closed that well without asking for any authority from the board of health or any one else. I simply took the bucket off and closed it.

Mr. Warner—Where was the well—on private property?

Dr. Howe—Yes, sir.

Mr. Warner—And people living elsewhere came there and got the water, under permission so to do?

Dr. Howe—Yes. I closed that well and it stands closed to-day under my order. Now the question is have I a right to do that? I will state that the State Board of Health has confirmed my analysis.

Mr. Warner—Have they confirmed your action?

Dr. Howe—They have analyzed the water. The point I want to get at is, have I a right to hold that well closed, and has the party suffering any redress on the manufacturer who has polluted this well?

Mr. Warner—Now you present a different inquiry from the one you started out with. Let me see if I understand you. I understood you first to inquire as to who would be responsible to the injured person—the one who suffered from disease contracted. The difficulty of answering that is that it involves a legal proposition, and other facts that you have not stated might have a bearing upon it—the question as to the right of persons to go there and get this water and the necessity for it, the question of who contaminated the well, how the contamination arose, and those things. Now you pass to the question of the responsibility to the owner for the contamination of the well.

Dr. Howe—Yes, there was a large manufactory there.

Mr. Warner—These questions involve personal rights and are not matters of public concern. As to the question of liability, I would not like as a lawyer, on an ex parte statement of facts, to express an opinion upon them.

As to whether you were justified, in your capacity as a health officer, in going ahead and shutting up the well, I should unhesitatingly say that you were if you knew that a number of people were drinking its contents and that it was contaminated. But the other two questions involve purely questions of personal right and liability between the parties, and do not concern the public.

Dr. Bowen—Supposing, after the doctor has taken the bucket off the well and closed it, that it is reopened. What does he do then?

Mr. Warner—If he is diligent and knows it is contaminated, he will close it up again.

Dr. Howe—I have got the bucket. I might say that it was in July when we were having a good many heavy rains, and in our village we are unfortunate in having no sewerage system and we are dependent entirely upon cesspools, which I think are the greatest evils in many of our small villages, and I at once issued a request that all parties drinking the water from wells within a radius of one hundred and fifty feet from any cesspool should send a specimen of that water to me at once, and I analyzed the water from twenty wells and found five of those wells contaminated very badly, and without any order from the board of health I went and took the handles off those wells, and have got them. Those wells are closed, because I found colon bacillus and found indications of contamination, and regarded it as my duty as health officer to close those wells. The question is whether I have passed beyond my authority or whether I was justified.

Mr. Warner—That presents one of the cases that I have referred to, that are easily gotten along with without following out the legal formality. Technically speaking, perhaps, it was your duty to submit your findings to the board of health and have the board make an order. But you got along all right with it, as the health officer will in a great majority of cases. The technical rule would direct otherwise. I might state that you are not limited in your manner of abatement in taking the bucket off and closing it, if the well was susceptible of cleansing. Some times you can cleanse a well, and charge it to the owner.

Dr. Howe—The source of contamination was still feeding it.

Mr. Warner—Then you could not do it.

Dr. Pomeroy (of Stuyvesant)—In a case of smallpox, in the event of our deeming it necessary to destroy the wearing apparel and bedding, is it recoverable against the municipality?

Mr. Warner—I do not understand that that question has ever been decided by the courts of this state; but I refer in my paper to a case in Iowa where the court held that the expense of the destruction of infected property was a public charge.

Dr. Pomeroy—I noticed an opinion of your office (your predecessor) that it would not be a public charge.

Mr. Warner—Was that under the present law?

Dr. Pomeroy—I don't know—I think not under the present law. No material change has been made in it.

Mr. Warner—I would not care of course to get into a conflict of opinion with the office to which I am attached. I am not entirely satisfied that the expense caused by the destruction of clothing and things of that kind should not be a public charge. Presumptively those things are destroyed because of their infected condition, for the good of the public, and where the public profits by any of those things, ordinarily the public should pay for it.

Dr. Pomeroy—This individual case that I speak of was in a brick yard. Of course the people are wealthy people and the case broke out in one of their tenements or boarding places, and I had the property destroyed.

Mr. Warner—The building?

Dr. Pomeroy—No, the bedding and contents of the room. It was of such a nature that I did not deem it advisable to try to disinfect it, and destroyed it. The question is as to whether we are legally responsible for that property.

Mr. Warner—That question can only be determined by a decision of the courts, because it has never been decided in this state. My personal notion about the thing, as you state it, is that the community should pay for that clothing that was destroyed as a public measure for public good.

Dr. Pomeroy—Another thing. I have a nuisance that has been complained of. There is a party that keeps nine dogs right along in the village street, and at night they howl all night. They complain of that as a public nuisance. It is very detrimental to health that people have got to be kept awake all night. Is that in the jurisdiction of the health department? You say that dogs are property and can not be destroyed any more than horses. What is our remedy?

Mr. Warner—I adhere to my proposition that you could not destroy them. I suppose that any condition that exists by reason of which the public are prevented from sleeping at night is a condition which will result in the impairment of health, and I should aver that if a man maintained dogs in such quantities that the public could not sleep in the neighborhood because of their howling at night, that he might be compelled to restrain them in some way. There would be no power to kill the dogs.

Dr. Pomeroy—How can we make him dispose of his dogs, or can we do it at all? It is simply the fact that the dogs are there and annoy the public.

Mr. Warner—You could restrain him from keeping dogs in that way by injunction through the courts. It has been held in this state and elsewhere that any one in the neighborhood who is disturbed or kept awake by this condition and suffers an infraction of personal rights, could personally proceed against the owner of the dogs and have them shut up. I can not tell you where they should be shut up or anything of that kind. Dr. Lewis says he has a case right in point on that proposition.

Dr. Lewis—This case, as you state it, was mild when compared with one a few weeks ago in East One Hundred and Second street, New York city, where a party kept twenty-three dogs in a flat, first floor and basement, of a dwelling house. The complainant was the man's wife. She came surreptitiously to me and I addressed a complaint to the city board of health, and the city board of health finally went in and took the dogs and carried them to the Society for the Prevention of Cruelty to Animals, and what became of them I don't know, but the city board of health took charge of the dogs, and the man's wife, I suppose, is happy.

Dr. Odell (of Canisteo)—I have a case of a railroad which cuts across a bend in the river and shuts off the water from running in and running out—years ago—that was done in 1848, and it ran along for a number of years and the water got so foul and smelled so bad and was green on top so that diphtheria broke out around it; and I was health officer at that time (not in 1848, but since) and I served notice on them and they came and put in an inch pipe. I told them I didn't think it was big enough, but the man says, "If it is not large enough, I will put in a larger one." This pipe has got stopped up, and I have been ever since last spring or summer getting them to open it, and they have not opened it yet, and they have had typhoid fever around it, and the water has smelled very bad and it has been green. I want to know if there is any way to hurry them up any.

Mr. Warner—I should suggest that the easiest way is the best way—if I were the health officer I would go and hire a man and have the pipe cleaned out, without figuring over any legal technicalities as to liability for maintaining the nuisance.

Dr. Odell—They are going to put in a four foot pipe under that railroad. They have got to drive piles and put timbers on top, and it is an awful job; they have got to go twenty-two feet deep, and the water over that pipe is from six to eight feet deep.

Mr. Warner—Undoubtedly the railroad is responsible for the maintenance of a nuisance there. There was a very similar case presented to the courts of this state some years ago. I have a memorandum of it in my paper—a very similar condition.

The board of health determined it to be a nuisance, and directed the health officer what to do—to construct a culvert to let the water run out; and it was all done without giving the railroad any notice or opportunity to be heard. It got into the courts, and the court held that the railroad was liable for the maintenance of the condition, but that the health officer could not abate the nuisance without giving notice to the company and affording the company an opportunity to be heard. So if you

: a nuisance there which you can not in a practical and simple get rid of, you better have somebody file a complaint and it up, according to the formula I have suggested—notify company to abate it within a certain number of days, and if don't do it, serve upon them an order to show cause, directthem to appear before the board and show cause why it ld not be abated, etc.

r. Burney (of Cortland)—The question in my mind is this: state requires that each town should organize a board of th and that such board should employ a physician residing ach town as health officer. Now some of our towns are so anate (or unfortunate, I don't know which) as not to have a ician living within the municipality. What are we going o in such a case?

r. Warner—That sort of a condition has been called to my ntion once or twice during the year. Under the present con- n of the laws there is nothing to do but to import a ician.

:. Phillips (of Morristown)—I have been laboring under eat mistake. I want to know if you want us to understand the health officer has no power to determine what consti- a nuisance, or is that power exclusively in the hands of the d?

r. Warner—I mean to be understood in this way: that in of serious import where it becomes necessary to determine her or not a condition is a nuisance for which somebody is e, where there may be a question or dispute about it, that ealth officer has no power to make the adjudication, because aw vests that power in the board of health, and if the board alth decides wrongly and reaches a wrong conclusion, and ealth officer goes ahead and abates it, as I have said to you, es it at his peril, and is personally liable.

. Phillips—I supposed one of the duties of the health r was to determine what constitutes a nuisance. The board ints a health officer, and their attention is called to some- , and they say, "We will send our health officer and he can d examine it, and if he reports it to be a nuisance we will take action, but if he don't report it to be a nuisance, we have nothing to do with it." That is the general impression that prevails among a great many people throughout the state as to the health board and the health officer.

Mr. Warner—I have endeavored to make myself plain, that in the great majority of cases the health officer can get along without any difficulty—in ninety cases out of a hundred, or even a greater percentage than that, but whenever it may become necessary to defend your action in court, then the board of health should be called upon to act—you ought not to settle it yourself. What I want to impress upon you is that under this decision of the Court of Appeals, if you have a situation in which there enters doubt, or you have an obstreperous individual to deal with, you had better follow the determination of the board in that case, and not attempt to decide for yourself, but simply state the facts and the result of your examination to your board, which is appointed for that purpose, and must act accordingly.

Dr. Goff (of Corning)—I have been directed by the board of health and the city attorney to ask the counsel for the commission this question: We have had smallpox there, and during the epidemic a case occurred in the town, outside the city limits. It was taken care of by the town board, and on examination they found that the case was a pauper and belonged to the city, who had had a residence in the city and had not gained a residence in the town, and had, since he had lived in the town, been supported by the city. They turned him over to the health officer to act as his physician. He cared for him and now brings in a bill of $170 for his medical attendance. As health officer, he quarantined the case, and refused to allow the officers or physicians appointed by the city of Corning to have anything to do with it. He cared for it as a physician and held it under his control as quarantine officer, and although requested by the authorities of the city, who had a hospital established and were caring for the cases, and could easily care for them at almost a nominal expense, he refused to allow it to go there, and allow the physicians who were caring he smallpox cases throughout the city to come and take there, and he put the city to an expense of $300.

r. Warner—Was the health officer receiving regular com- ation for his services as health officer?

. Goff—Yes, sir.

r. Warner—If you will see me when we get through, I will v you a case which holds that where the health officer ives a regular salary for his services and takes care of llpox cases and makes an additional charge, he can not ct it. It is supposed to be a part of his ordinary duties, the fact that he does make visits to smallpox patients and extra pay because his services are extra-hazardous, does entitle him to any extra compensation.

. Goff—It is against the city of Corning.

r. Warner—It is the same thing.

r. Leighton—Can a health officer refuse to take care of a of smallpox if ordered to do so by the board of health?

r. Warner—Yes, a health officer can refuse to do anything.

r. Leighton—I mean has he a legal right to refuse?

r. Warner—No, sir.

r. Leighton—I give you a case which occurred to me as th officer of the town of Orangetown, and I think this is ood time to bring it forward. An epidemic of smallpox e out this spring, and I as health officer detected a case mallpox. Up to that time there had been cases of small- in the family, which had not been diagnosed. One case one commonly called black smallpox. The patient died a death certificate was issued, not of smallpox, and a lic funeral was held at which 250 people were present. lve days afterwards I was called to attend the son and I d him with a case of smallpox, and two women who washed laid out this case of hemorrhagic smallpox came down in teen days with smallpox. I think this is interesting to e of the members here. One patient was sixty-two years ge, and had had when four years of age confluent smallpox, and had never been vaccinated since that time. As health officer, I refused absolutely to take care of the cases. Three physicians who had been offered the cases refused to take care of them. I then as health officer took these cases. They agreed that if I should take care of these cases they would pay me $10 a visit, when other physicians had refused; and under that agreement and contract with the town board I have proceeded to take care of the cases.

Mr. Warner—Who agreed to pay you?

Dr. Leighton—The board of health, in full session, and physicians present were offered the cases at $10 a visit and they refused to take these cases—no physician would attend to them. The board of health then directed me to take charge of the cases at $10 per visit. I practically quarantined myself and took care of those cases. At the end of the time I put in my bill for services and my bill has been cut down to zero.

I came 200 miles to-day to find out whether any law was ever made to do a man injustice, and certainly it is injustice to compel a health officer—to place a law on the statute books compelling a health officer to go out gratuitously and take care of smallpox. I was obliged to throw up my entire practice while taking care of these cases.

I think, gentlemen, that this law, certainly in regard to extra compensation for the care of contagious diseases, should be amended so as to put it in the power of boards of health to pay their men a proper amount of money for proper services, particularly when a man has a practice, as most of us have, and can show on our books, amounting to a much larger sum than the board of health is allowing us. This is an unjust law, and no law was ever put on the statute books to do an injustice. Lord knows we are poorly enough paid by the towns and villages and everything else. (Applause).

I have heard of that decision of the Mount Vernon case. The decision of the Mount Vernon case has been poured into my ears for the last two weeks, and into the ears of the town board of audit, to which I have referred my bill, and they tell me there is "nothing doing." I would like to know, has that a board of health a moral right to oppose that. Is there hing to prevent it?

r. Warner—A public officer has no such thing as a moral t at all.

r. Leighton—I know that physicians never have it.

r. Warner—Public officers' duties are determined by the You say no law was ever intended to do an injustice. A it many times there are laws which work injustice, and I k this case is one of that class. There ought to be a dis- tion between the health officer's duties as a health officer as a medical attendant, but there does not seem to be any. law makes the health officer the chief executive officer of board and provides that he must do what the board tells to do.

r. Bracken—I have had a little experience in my own state ch may help you. A distinction has been made in our e between the duties of a physician as health officer and as ical attendant. I think the distinction is followed that if he otified of contagious disease, to investigate and report the , and when he has made his diagnosis his work is com- ed to that point. It is then his duty to quarantine and keep tary control of the patient, but he can not be compelled in state to give any medical attendance, and for that purpose an, through the local board of health, employ a physician ake charge of it. He can not attend to it personally and ect for services, if he is drawing a salary, but the board of lth can employ somebody else to do it. The health officer absolutely refuse to give medical attendance in any con- ous disease after he has made a diagnosis.

r. Warner—That is the statutory condition in your state; is, the statute says these things?

r. Bracken—Yes, sir.

r. Warner—I observe, from looking over the statute here, we are deficient in that respect, and this whole talk is fitable because it suggests that there ought to be some ages made along that line in the statutes of this state.

As the law stands to-day, it makes the health officer the chief executive officer of the board and says the board shall prescribe his duties and what he shall do, and then imposes upon him the duty of doing something to prevent the spread of contagious and infectious diseases, however unpleasant it may be. It would rather look as though, under the present condition of the law, that you were in an unfortunate situation.

Dr. Leighton—In my particular case, where every physician in the neighborhood refused absolutely to attend the cases—except in one particular case where one physician had a case in his own private practice, and he continued out of friendship to the family to take this case and go on with it, and the board of health allowed him ten dollars a visit for that case—every physician in the locality refused absolutely to take charge of these other cases of smallpox.

Mr. Warner—The court held in that decision which has been dinned into your ears so long, that the board could employ another physician, and could pay him any reasonable amount, but that they could not agree to pay you extra pay. If you could not get a physician to take care of those cases, your town board would have to get some one somewhere else. If you can't get a physician to go in and take care of a case, I don't know how you are going to compel him to do it.

Dr. Leighton—Supposing I refuse?

Mr. Warner—I think, if I were put in your position and compelled to either comply with my duty under the law and go, or else not go, that I would resign my job.

Dr. Leighton—But if you know people are suffering you are not going to be a hog and let them die without attendance.

Mr. Warner—You would not have to let them die if you resigned, even though you were not longer the health officer.

Dr. Lewis—If you resigned as health officer you could then be paid.

Mr. Warner—If you resigned as health officer, you could then get reasonable compensation. Have you a local attorney there?

. Leighton—Yes, and this same local attorney is the one has advised the auditing committee to decline to pay my

. Warner—Attorneys sometimes think differently under ent circumstances.

. Leighton—It is not funny to put your family out of your e two or three weeks, and have your friends and every- else pass you with their hands up to their mouths, and dy send for you to attend to them—to have all this just he sake of receiving one hundred dollars a year. Some- should be done with that law, and if there is any such a as a legal committee connected with this State Depart- of Health, they should put it in the power of that com- e to pay the health officer extra compensation for taking of smallpox or diphtheria and such diseases, where he must ssarily lose a large amount of his practice. I think such a hould be prepared.

. Lewis—We will have such an amendment prepared, and if gentlemen here will help towards passing it, I think it will me a law. This is not the first instance that has come to otice.

. A. B. Rood (of Manlius)—I would like to ask a question onnection with this one. We are paid so much for each , three dollars for quarantining a case and three dollars for gating or a thing of that kind. In such a case as this, is e any way in which we can raise it to ten dollars, where we to attend a case of smallpox?

r. Warner—If you are not paid a regular stated salary by the th or year, and your board of health has seen fit to fix your pensation by a schedule of fees for doing particular things, urse the board, by resolution passed, can alter that schedule make a different allowance.

r. Bertram—I would like to ask in this connection: Sup- ng the town made no agreement with the health officer in rd to what his fees might be?

r. Warner—No agreement made anywhere?

Dr. Bertram—Anywhere.

Mr. Warner—Then you would go back to the elementary proposition that if a man comes along and goes to work for you, without any agreement as to what he should receive, and performs services which are of value and benefit to you in the end, he is entitled to recover upon what we lawyers term the quantum meruit—the reasonable value of what he may have done, that amount to be fixed by the court.

Dr. Bertram—He would have to collect through the court?

Mr. Warner—Not necessarily—if they could agree; but the board, if it never made a contract for his compensation, would be justified in paying him what the services were reasonably worth.

Dr. Peck (of Oneonta)—The way we fixed that matter in Oneonta is this: At the first meeting for organization of the board of health we fixed the salary of the health officer, not only that understanding, but we have it placed upon the minutes that he is to receive extra and reasonable compensation for the attendance on or looking after smallpox. In other words, smallpox is thrown out—it is something extra. That is placed on the minutes. I believe that is all right.

Mr. Warner—Well, I don't know, doctor; I don't want to make any criticism on your resolution, but I am rather inclined to think it is in conflict with the principle of the case that I have been talking about, that the gentleman over here is so familiar with.

Dr. Peck—I don't think the cases are parallel.

Dr. Leighton—My case is on the minutes of the board of health, that I was employed at ten dollars a visit to take care of smallpox. It is even on the minutes of the meeting at which I was employed, and signed by the board of health.

Dr. Peck—I want to ask if the board of trustees or the town board can refuse to pay a bill that is allowed by a board of health?

Mr. Warner—Under such a resolution as you describe?

Dr. Peck—Any resolution.

Mr. Warner—Well, that is a broad question. Under such a resolution as you describe I would not want to answer that question offhand, for I have quite a bit of doubt as to the validity of such a contract under this decision, because the court held that where the board of health fixed a definite compensation for the services of a health officer, he is not entitled to anything extra because the services are extra hazardous.

Dr. Peck—Well, I will bring this up again.

Dr. Poole—Where the health officer reports to the board a case of smallpox and then refuses to treat the case, and another physician is hired by the board and offered what was proper for his services and attendance, and then the trustees refused to audit a bill of over two dollars a visit, is there any redress for the physician? I am interested because I attended the case.

Mr. Warner—You were not the health officer?

Dr. Poole—I was not. The health officer refused to treat it. He was afraid to go by the house on the same side of the street.

Mr. Warner—My recollection is that the statute authorizes the board of health to fix your compensation.

Dr. Poole—They didn't fix the compensation; the trustees of the village refused to audit a bill of over two dollars a visit.

Mr. Warner—If they simply hired you to take charge of the case without fixing any compensation, then the question of compensation was left open, and under, I think, the Tarrytown case referred to, the bill you presented would have the same status as any other bill presented against the village. The village board could cut it down. If you were not satisfied with the amount at which they audited it, you by mandamus could bring the question up.

A Delegate—In case he was ordered by the board to take care of patients, is there no law by which he can collect what his services are worth, what he can prove his services are worth on a case of smallpox?

Mr. Warner—Certainly there is. I say to you that the village board of trustees—we will assume that you presented a bill of ten dollars per visit for a number of visits, and no fee was previously fixed, and the bill comes up before the village board of trustees for audit. They take the view of it that the amount charged is too great and they proceed to cut the bill down to say two dollars a visit. You are not bound by their determination; you are not bound to take that two dollars if you feel aggrieved and do not want it; the best thing is to consult your lawyer and institute mandamus proceedings to compel the board to audit the bill at the amount claimed, and then get the whole matter up before the court as to what is fair and just and reasonable.

Dr. Lewis—Really we ought to close this discussion, because we will have time, I think, to hear Dr. Pease's paper. If there are any further questions to be asked on this subject they can be passed up here and possibly be answered later.

Dr. Peck—I think, from what I have heard here this afternoon, that the majority of health officers labor under a misapprehension as to their authority and power. A health officer cannot determine what a nuisance is, as I understand it, he is simply the executive officer of the board of health. They instruct him what to do. He has to carry out whatever they tell him to do. They publish certain rules and regulations and then comes up the question what is publication; and all these other causes of nuisances must be determined by a committee appointed—the statute says so—appoint a committee to determine and report; and then a copy is to be given to the one who is maintaining the nuisance, and all that sort of thing. Health officers are going to get themselves into trouble if they don't look out.

Dr. Lewis—Doctor, this paper of Judge Warner's will be published in due time, with reference to cases. I think it will be a very valuable paper for us to have in our possession, and if it has the effect of showing some of the defects in the present law, so much the better. Defects in the law can usually be remedied.

Dr. Lewis—We will now listen to a paper by Dr. Pease, the director of the Antitoxin Laboratory, on Antitoxin as a Therapeutic and Prophylactic.

DIPHTHERIA AND TETANUS ANTITOXINS AS THERAPEUTIC AND PROPHYLACTIC AGENTS

By Herbert D. Pease, M. D., Director Antitoxin Laboratory

Mr. Chairman and Members of the Conference—It is my intention to present to you some of the important points concerning the use of diphtheria and tetanus antitoxin, first as therapeutic agents, and secondly as prophylactic or immunizing agents.

It seems almost unnecessary to speak to this audience about the value of antitoxin in the treatment of diphtheria. However, if there are those who even yet doubt the fact that the use of antitoxin for treatment has materially and permanently reduced the death rate from that disease, even a passing glance over recent statistics must convince them of their mistake.

The very recent statistics compiled by Mueller show the number of deaths in all the German cities of over 40,000 inhabitants for two periods, one for six years before the introduction of antitoxin, and another for the six years from 1895 to and including 1900. He carefully considers the increase in population, and eliminates by the extent of his observations, which covers ninety cities and 12,000,000 people, any possibility of error in records or peculiarities due to local conditions. He shows that in the pre-antitoxin period the number of deaths per 1,000,000 inhabitants, varied from year to year. A year with high mortality was often followed by one with a remarkably low one, or vice versa. Since the year 1895, which divides the periods, the number of deaths has not only, as he says, been reduced two-thirds, but the decrease has been an absolutely gradual one. In no year of the six of the antitoxin period did the number of deaths fail to be less than that of the previous year. The downward curve has been without a single upward ripple. Surely some new influence must have been operating during the second period of six years from 1895 on, and what radical change occurred during that period other than the introduction and spread of the use of antitoxin for treating and preventing the disease.

Add to these figures the statistics gathered by Siegert from the record of five children's hospitals in Vienna for fifteen years from 1866 on. His figures cover 17,626 cases of diphtheria. Not only did the mortality curve pass gradually downward, from always over 40% of the cases before 1895 to below 15% in 1900, but the number of necessary operations, tracheotomies, intubations, etc. became reduced from 43% of the cases in 1893 to 29% in 1900, and the mortality from such operations was reduced from 70% in 1893 to 29% in 1900. Siegert has also taken into consideration all possible objections to statistical evidence, and still draws the conclusion that the absolute and relative mortality, beginning with the years 1894-95 and the introduction of antitoxin, has decreased to previously unknown limits. This he says is demonstrable from the statistics of practically all Europe.

In our own country the available statistics show like results. In a previous communication I have called attention to the statistics of the Massachusetts State Board of Health for 1900. The fatality in that state was reduced from 28.3% during four years before 1895 to 10.2% for the six years after that date. Especially interesting was the death rate of 10.6% for the year 1900 with an increase of 85% in the number of cases of the disease in the larger towns of the state. In the same way the deaths from diphtheria, per thousand deaths from all causes in New York State, were cut down from a seven years average before 1895 of 50, to less than 30 for the seven years of antitoxin treatment since that year. This made an estimated saving of over 2500 lives in this state in 1900. However, the most interesting statistics concerning the decrease in death rate in diphtheria are to be found in the Volume III of the last United States Census on Vital Statistics. Not only does it show that the number of deaths from diphtheria per 100,000 deaths from all causes had decreased over 50% and that the death rate per 100,000 population in the so-called registration area had decreased exactly 50%, but it shows that in the United States there were 11,340 less deaths from diphtheria in 1900 than in 1890 when there were 27,815. The reduction in absolute number of deaths, irre-

ctive of the increase in population, was two-fifths of the
nber dying in 1890. In 1890 diphtheria was sixth most pro-
cause of death in the entire country—in 1900 it has dropped
the seventeenth position. A greater decrease in the ratio
deaths from single causes to that from all causes has oc-
red in diphtheria than in any other disease. No other dis-
e has showed even as great an increase in death rate as
htheria has shown decrease. Such a remarkable alteration
death rate could hardly be possibly due to natural causes.

have recently studied the reports which have been sent in
the physicians in the state who have used the antitoxin pre-
ed and distributed by this Department. Reports have been
eived, I am sorry to say, from but few of the physicians who
e used the Department's antitoxin. The mortality had been
s than 10%, which is low, although the fact that so few re-
ts have been received compared with the number of cases
ated makes it impossible to draw any accurate conclusion
n the mortality. The chief value to be obtained from these
orts is the information concerning the management of the
ividual cases. The time of the first injection, size of dose,
the complications, etc., with the consequent results are the
ef points to be noticed.

have selected the reports on several cases and will comment
n them:

Number of case.	Date of onset.	Dates of injections.	Units injected.	Complications.	Results.	Date of death.	Remarks.
80	8th.	10th.	2500	None	Death	14th	Treatment well started should have been continued.
		10th.	1500				
91	13th.	14th.	1000	Malnutrition	Slight	16th	Doses far too small for this case.
		15th.	1000		Slight		
92	10th.	14th.	2000	Laryngeal Diphtheria	Slight	19th	Report shows a lack of vigorous treatment both in size and frequency of doses.
		15th.	2000		Slight		
		17th.	2000		Slight		
122	11th.	12th.	3000		Death	12th	Dose too small.
6	6th.	10th.	2500	Intubation	Death	11th	A larger dose repeated should have been given.
127	24th.	25th.	2500	None		31st	Patient apparently entirely recovered, died suddenly of heart failure.
178	8th.	10th.	1500		Getting worse		Ultimate recovery under fair-sized doses frequently repeated.
		11th.	1500		Breathing difficult		
		11th.	2500				
		12th.	2500		Improvement		
		12th.	1500		Improvement		
278	13th.	14th.	2500		No effect		Ultimate recovery under persistent treatment with fair doses
		15th	2500		Progress of disease stayed.		
		15th	2500				
		16th.	2500		Improvement		

hese cases of death from heart failure are proportionately
re numerous than before the advent of antitoxin. They are
y frequently seen in those cases having diphtheritic par-
sis. The increased frequency of both of these complications
readily explainable by the fact that many cases experience
rtial benefits from antitoxin but not the full measure of pro-
tion to be obtained. Laboratory experience upon this point
very instructive. Guinea pigs, injected with just enough
titoxin to prevent their death, but not enough to fully pro-
t them for one or more fatal doses of diphtheria toxin suffer
ry commonly from paralysis and general weakness, and they
equently die from such complications weeks and months after
e experiment. Larger amounts of antitoxin will protect these
imals from any bad effect of poison, and large amounts of
titoxin given early in the disease and frequently repeated will
solutely protect human beings from such complications.
aralysis and heart failure indicate either the late or the too
eager administration of antitoxin. Delay in the administra-
on may not be the fault of the physician, but the size and fre-
ency of the dose is altogether within his power. No physi-
an of this state may now use the plea of economy for his
w or small doses of antitoxin, for the state offers it without
mit and free of cost to those who cannot afford to obtain all
at is needed from commercial sources.

The doses recommended by the State Department of Health
the circular accompanying each bottle are conservative ones.
arger doses more frequently repeated may be used to advan-
ge in many cases. Antitoxin is not a drug. It is not like
ost of them, of advantage in small doses, but poisonous in
rge ones. It is a pure antidote for a poison but without any
al poisonous effect of its own. There need be no limit,
herefore, to the size or number of the doses. The injections
hould be kept up until absolute convalescence is definitely in
ight. McCollum often used from fifty to a hundred thousand
nits within a week on a single case with excellent results.

While in antitoxin properly used we have an ideal remedy for
he treatment of diphtheria, we have also in this agent the ab-

solutely sure means of preventing the disease. Relatively small amounts of antitoxin are needed to protect a person from infection by diphtheria bacilli. It has been estimated that about 75% of the antitoxic principle in a given amount of horse serum which has been injected into a human being is excreted within twenty-four hours and that the remaining 25% at a much slower rate. It is therefore some portion of this last 25% which brings about the temporary immunity. It has also been demonstrated that an injection of from three to five hundred units of antitoxin will prevent infection for from three to four weeks in the average person. For protection from continuous or subsequent exposure during a longer period the initial dose should be larger, or the previous dose may be repeated. In the event of a case or cases of diphtheria occurring in a large institution all the inmates should be immunized in this way.

It has been repeatedly demonstrated in such institutions that the only safe plan is to thoroughly protect every person in the institution with preventive doses of antitoxin.

In nine institutions in this state 1200 persons have been injected with immunizing doses of antitoxin supplied by the State Department of Health, and not one of them contracted the disease, although many continued to be exposed to the infection.

Two cases from the practice of one of the physicians of Albany give the following interesting history: Two children, the first an infant, were given 300 and 700 units of antitoxin during a local epidemic of diphtheria. Owing to the bad maintenance of quarantine they continued to be exposed to the disease or to convalescing persons until the passing immunity from the antitoxin was lost. The infant lost its 300 units of antitoxin in four weeks and then had the disease. The older child losts its 700 units in five and a half weeks and then became ill with diphtheria.

It is evident, therefore, that persons who from necessity are continuously exposed to infection should be repeatedly protected with antitoxin. The duration of such protection varies somewhat with the amount of antitoxin used, but from four to six weeks is the average period.

When we approach the subject of the use of antitoxin in the treatment of tetanus we find an entirely different problem from that in diphtheria presented for our consideration. In order to comprehend the problems involved let us consider the disease in its various stages and note some of the features peculiar to it. The bacillus practically always gains entrance through some wounded surface. As it will not develop in the presence of oxygen tetanus is rarely a sequel to superficial injuries. In deeper injuries when earth, manure or other dirt, carrying along the tetanus bacillus, are ground into the tissues, the proper conditions for its development are more often found. The bacillus will also grow in superficial wounds if along with it, we have oxygen consuming bacteria growing, which thereby create the proper anaerobic conditions. During the growth of the bacillus, poisons are elaborated by it which are capable of being readily absorbed into the fluids of the body. The exact nature of these poisons either collectively or individually, or their usual proportions has yet to be ascertained. The particular tissue element which they especially attack, resulting in the characteristic muscular rigidity and convulsions, is still disputed, although it is generally supposed that in human beings the anterior nerve roots in the spinal cord are the chief elements affected. The path traversed by the poison from the wounded area to these nerve elements is also a matter of dispute. Whether by the general circulation or along the nerve trunk or some other method, is not yet known. However, the deciding factor in the onset and progress of the infection in human beings is the formation of those conditions in the wounded area which favor or hinder the growth of the specific bacillus, and thus advance or retard the production of the specific poison. Doubtless this micro-organism at times gains entrance into wounded tissues and no disease results on account of the lack of a favorable environment for its growth. The development of a serious case, on the other hand, only follows the formation of a highly favorable environment for their growth in the wounded area. Between these there are several grades, a common one being a condition which permits the growth of the bacillus to a limited extent. Experience has shown that as a general rule the time consumed in the formation of those more or less favorable conditions for the infection, is a strong indication of the degree to which they finally become suitable for the growth of the bacillus. That is the longer the period the less is a highly favorable condition likely to be formed. It has also been demonstrated experimentally, that the rate at which the poison passes from this wound to the nerve elements, and also the degree of poisonous action which it has toward those elements, increases in a decidedly proportionate degree, within certain limits, with every addition to the amount and the rate of toxin production at the site of infection. All these factors tend toward the generalization that a short period of incubation is usually followed by a rapid onset of the most serious symptoms, which is very commonly followed by a rapidly fatal termination, and that on the other hand a prolonged incubation period is indicative of a milder infection. In the latter case there may be exceptional instances, due to some late and decided change in the condition of the wound, permitting a rapid development of the microorganism and thus leading to a severe attack. While the duration of the period of incubation gives some indication as to the probable outcome of the case once begun, no sign or symptom is to be observed during this period which gives any warning whatever that the infection has or is about to take place. By the time the symptoms have appeared the combination between the toxin and the nerve elements has to a varying degree taken place. The extent of the combination depends, as has already been said, upon the date and strength of toxin being produced and absorbed. All these factors have their very decided bearing upon the results likely to be obtained from the prevention and treatment of the disease with antitoxin.

As the period of incubation gives no warning of the presence of the infection, and as the disease is well advanced, in the acute cases at least, by the time the symptoms appear, it is imperative that the administration of the antitoxin be begun at the earliest possible moment after the diagnosis is made. In order to save as many of the valuable moments as possible, various investigators have endeavored to work out methods which would bring the antitoxin in direct contact with the nerve elements affected in its almost pure state undiluted by the blood or other fluids of the body. These various methods of the administration of the serum have been founded by their authors upon their individual conceptions of the tissues affected and the path of the poison.

From our present understanding that the anterior roots of the spinal cord are the chief elements affected, the method of injection by means of a lumbar puncture as devised by Blumenthal and advocated by Von Leyden would seem to be the most logical, but the amount which can be given is small (about 5 c. c.) and a concentrated serum is absolutely essential. When the serum is given intravenously the amount which can be given is almost without limit. Five hundred c. c. have been injected daily for many days in a case with a successful termination, as was demonstrated by Mixter. The intravenous method brings a large amount of the antitoxin directly into contact with any toxin which may be present in the circulation, neutralizing it, and then passes out into the tissues and acts upon the toxin in combination with the nerve elements.

The intracerebral method of Roux and Borrel consists in injecting amounts up to three c. c. directly into the brain substance, and is similar to the method advocated by Kocher who injects amounts of from 2½ to 3 cubic centimeters of the serum into the lateral ventricles of the cerebrum. Highly potent antitoxins are also essential when injections are made in these ways.

By far the most common method is that of subcutaneous injection. When surgical assistance is not available for performing one of the operations already mentioned this method of hypodermic injections should be selected. The amount to be injected may vary with the severity of the disease, but as large amounts as can be obtained and injected *early* should be used.

The treatment of a case of tetanus requires courageous judgment and tenacity of purpose, for the proper treatment in practically every case must of necessity be intelligently heroic. The usual recommendations as to the quietness, rest, use of sedatives should be persistently followed, and in administering the antitoxin do not disturb the patient more than is necessary to give it by the best methods which the circumstances permit. However, do not be disturbed or deterred from the repeated use of the antitoxin by slight elevations in temperature, or even an increase in the spasms immediately after an injection. The serum can not act immediately and the disturbance due to operation will tend to temporarily increase the spasms. In any severe case your efforts are largely directed toward preventing the far more serious symptoms sure to follow if not prevented by the antitoxin, rather than toward the relief of those already existing.

Statistical studies upon results obtained by the use of tetanus antitoxin for treatment during the last seven years are far from giving a satisfactory estimate of the influence which such treatment may have had upon the mortality from the disease. Moschcowitz has made a most careful and elaborate investigation of 388 cases treated and reported up to April of 1900. The death rate in these cases was 42 per cent. There is no question but that many of the cases he has included were not tetanus, and moreover there can be no doubt that a tendency exists to report favorable results and to remain silent about the unfavorable terminations. The figures given by Moschcowitz are open to these objections, but his conclusion, which is more conservative than his figures, is that antitoxin therapy appears to have a distinct beneficial influence upon the course of tetanus.

Lambert also has compiled statistics and given as his conclusions that the death rate has been influenced somewhat more in the subacute and chronic cases than in the acute. The former are roughly the cases with an incubation period of over ten days or with a slow onset of the serious symptoms, and the latter or the acute are those cases of shorter incubation or a more rapid onset. In the years before the use of antitoxin the death rate in acute cases he says varied from 78 to 96 per cent, and in the chronic form 17 to 55 per cent, with a fair estimated mortality of 88 per cent in the acute and 40 per cent in the chronic cases. In an analysis of 279 cases treated with antitoxin his estimates, after making proper allowances for cases improperly included in the list, give the mortality rates in these two classes as 72 per cent for the acute and 16 per cent for the chronic. His figures show a definite though moderate improvement in the death rate.

Recent figures by Pfeiffer upon 93 cases where Behring's serum was used show 47 per cent of recoveries.

In marked contrast with the rather poor showing of the figures for the antitoxin treatment of tetanus are the figures given for the results obtained by the use of tetanus antitoxin as a preventive agent. Although at present these results are to be seen largely in veterinary practice, there is no valid reasons why equally good results should not be obtained on man, and the figures obtainable indicate a large future use of tetanus antitoxin in this way. Taylor quotes from the experience of Nocard, who obtained reports from the use of preventive injections of tetanus antitoxin in 2,727 wounded or injured horses without a single case occurring, while 191 cases occurred in the practice of the same veterinarians in horses not so protected. McFarland and Ranck have shown the power of such protection on horses subject to repeated punctured wounds during the process of diphtheria antitoxin production. Before using tetanus antitoxin as a preventive agent the death rate from tetanus in their diphtheria horses was about 10 per cent. in one year; after the inauguration of the injection of preventive doses of tetanus serum the death rate from that disease was less than 1 per cent.

The horses used in diphtheria antitoxin production in all the important laboratories are regularly protected from tetanus by such use of tetanus antitoxin.

In human beings the results obtained by Taylor in the Hudson Street Hospital in New York city speak strongly for the regular use of such preventive injections. During the few weeks around the fourth of July, 1899, thirty-two wounds from toy pistols were treated with three (3) cases of tetanus. In

July, 1900, twenty-seven such wounds were treated, and in fourteen of them the preventive doses of antitoxin were administered with no cases following, but in the other thirteen cases not so injected one had tetanus and died. Such use of tetanus antitoxin is a matter of regular routine in cases of similar injuries in many New York hospitals.

It is of course impossible to say, on account of the particular conditions surrounding the production of this infection, whether persons so treated would or would not have had tetanus if not treated, but they should be given the benefit of the doubt, especially as no danger of any kind accompanies such injections. The injection of a protective dose of tetanus antitoxin should be a regular part of the treatment of all punctured wounds, particularly of the hands and feet where garden earth, manure or dirt has been carried to the tissues, and especially is this desirable in localities where persons with such injuries in the past have developed tetanus.

According to the census of 1900, 147 deaths from tetanus occurred in New York state, 84 of which occurred outside of New York city. Already since June 1st of this year this Department has received death certificates for 27 cases giving tetanus as the cause of death. While many cases of injury are not seen by physicians, the majority are, and inasmuch as the State Department of Health is now offering tetanus antitoxin free, and is willing to place a liberal supply in the hands of every health officer of the state, there would seem to be no reason why tetanus should not be almost completely wiped out by the use of protective injections.

As I have stated already, the State Department of Health is now in a position to forward to every health officer of the state liberal supplies of both diphtheria and tetanus antitoxins to use either for the treatment or the prevention of these diseases in those unable to buy these remedies. One of the chief objects in view in this work is to allow persons unable to purchase enough antitoxin to be treated properly, to receive the necessary and effective large doses of the remedy. Persons who might be able to afford to buy one thousand units but need five to ten thousand may have the needed amount as well as those unable to buy any at all. With a free remedy it is indeed inexcusable for any physician in this state to inject a patient with a paltry 1,000 units of diphtheria antitoxin when ten or fifty thousand may only be barely sufficient to bring the case through. The unfounded fear of using too much might also be excusable if antitoxin was even a mildly poisonous agent. After the experience of hundreds of practitioners who inject anywhere from four to six thousand and upwards every six to eight hours for days at a time without the slightest injury, the fear some have of using too much is without excuse.

Finally, the Department asks that the applications and receipts for the serum and the reports on the results obtained, be properly filled in and returned to us. It also trusts that the local health officers will follow the example of the health officer of Buffalo, who has specially notified every physician of that city that he is prepared to supply the antitoxin for use under the regulations. The Department is always ready to furnish information and advice upon any phase of the subject, which it has endeavored to do through the Bulletin during the past year, and will make efforts to do so to an even greater extent during the coming year." (Applause.)

Dr. Johnson (in the chair)—This paper of Dr. Pease is very interesting, probably none could be more so, as we have no disease in the state more serious and which causes more trouble when it gets into a locality, than diphtheria.

Are there any questions to be asked or discussion to be had upon this subject?

Dr. Smith, of Palmyra—I would like to ask Dr. Pease how long those supplies of diphtheria antitoxin are good?

Dr. Pease—I may say that diphtheria antitoxin of the ordinary strength, not the high grade of seven or eight hundred or one thousand units in a cubic centimeter, which depreciates rapidly, but the standard strength of from three to five hundred units in a cubic centimeter will keep up the strength marked on the bottle up to six months. After that time it will gradually lose a little of its strength; but other than the loss of strength there is no depreciation. It could be used after that time, but in larger amounts.

The Department is ready to replace all serum held by health officers over six months. Of course, antitoxin holds its strength best if kept in a refrigerator or other cool place. If kept in a warm place or near a stove it will depreciate very quickly.

Dr. Coles—I would like to ask the Doctor if there is anything in the appearance of the antitoxin that will lead one to suspect depreciation after it has been kept some time.

Dr. Pease—All antitoxin becomes slightly cloudy after it is kept for six or eight months. The extent of this cloudiness varies somewhat with the method of preserving the serum. Ours is preserved with a very small amount of chloroform, but it has no other agent in it. Most of the commercial antitoxins have been treated with trikresol or carbolic acid. Serum put out containing chloroform or without any preservative whatever will throw down a little flaky precipitate after three to five months. But upon examination of the precipitate under a microscope, these flakes are found to be crystals. There is nothing to indicate that they are of an injurious character. A slight flaky precipitate or cloudiness is of no importance. If bacteria gain entrance and there is not enough antiseptic to prevent their growth there will either be a bad odor or complete clouding of the serum; under ordinary circumstances, unless the serum has been badly handled, the package as sent out will be absolutely free from bacteria, and bacteria cannot gain entrance until the cork has been manipulated in some way or other.

Dr. Smith—Did I understand the doctor to say that tetanus would not develop from a superficial injury?

Dr. Pease—As a general rule it does not. Occasionally some foreign substance gets into the wound with the tetanus bacillus, and creates a condition favorable for the growth of the latter.

Dr. Smith—This question anticipates another. That is: That if it doesn't come from a superficial injury, how are we going to account for the presence of tetanus after vaccination if there is such a thing?

Dr. Pease—The explanation which has been given by Dr. McFarland of Philadelphia, who made recently an investigation of all the cases he could obtain histories of, was that tetanus only occurred in vaccination where the sore was a deep one. It might also be explained by the action of pus producing bacteria in using up in their growth the available oxygen and thus bringing about conditions favorable for the growth of the tetanus organism.

Dr. Archbold—I would like to ask what the doctor would consider a good dose for a child two years old, suffering with laryngeal diphtheria—that is what sized dose would you start in with?

Dr. Pease—From three to five thousand units.

Dr. Archbold—In the case of a two year old child?

Dr. Pease—Yes. I would not regulate the dose according to age in children. In treating an adult I should give a much larger dose than in the case of a child.

Dr. Archbold—Repeating how often?

Dr. Pease—Every eight hours.

Dr. Archbold—I would like to ask if you ever had any experience with cases where such a dose had been given with apparently no result within thirty-six hours. Given a child two years old, in which 5,000 units standard antitoxin had been used, and that again repeated in twelve hours and repeated again in twelve hours, and the laryngeal symptoms becoming much more severe, in fact necessitating the operation of tracheotomy—how could it be accounted for that there was no result?

Dr. Pease—I would like to ask the doctor about this special case. First as to the period of time after the onset of the disease before the antitoxin was first administered. That has a very great influence on the course of the disease and the course of the treatment.

Dr. Archbold—Well, it was four days.

Dr. Pease—That accounts for the result in all probability.

Dr. Archbold—The girl was taken sick on Saturday and on Tuesday at five o'clock in the afternoon the 5,000 units were administered, and twelve hours after that 5,000 more were administered, and following that, twelve hours afterwards, 5,000 more, and still apparently no result. Even after the operation of tracheotomy there was but little apparent effect from the 5,000 that had been administered two hours before the operation.

Dr. Pease—What was the result? Did the case die?

Dr. Archbold—No, recovered; but it was with a slower recovery after the tube had been introduced than in cases where we have administered the same amount, and the tube remaining in the trachea but a very short time.

Dr. Pease—The only theory which would explain the effect of the antitoxin not being as vigorous as it should be, as the doses were fair sized doses, was the late injection. This case had been running for a long time. That of course is not within the power of the physician to regulate; but a case that has been for four days can not be expected to do well with antitoxin as a case which had only been running for twenty-four hours. The death rate grows proportionately larger as the delay in the administration of the antitoxin increases, so that when you get up to the fifth or sixth day, the use of antitoxin in moderate doses appears to have very little influence on the death rate.

Dr. Archbold—Isn't it possible that the antitoxin might have been bad? The appearance of it was all right in the bottle.

Dr. Pease—I have had similar inquiries from one of the health officers of the state. The only thing I can say is this: All the antitoxin produced in America by the different laboratories is practically tested by the same procedure. The antitoxin with which we all test our toxins is obtained from Professor Ehrlich's laboratory in Germany, and therefore we all have the same foundation for our test. In all probability when you come to consider the effect of antitoxin on cases it is much more likely that the cases vary than that the antitoxin does. You can readily understand that it is absolutely impossible for any one to estimate the amount of poison that is in the circulation or in the system of a case of diphtheria.

Dr. Smith—I would like to ask if the department has had any experience in administration by the mouth?

Dr. Pease—I have no experience with the administration by the mouth. The very nature of the antitoxin principle is against such administration. The antitoxin principle is probably an albuminous body which is capable of digestion. The very fact that it could be digested, would indicate that, if given by the mouth in human beings, the chances are it would be digested and would not be absorbed in the shape of antitoxin, but in the form of digested products of these albuminous bodies. We cannot say definitely that antitoxin is an albuminous body, but up to the present time the argument is against the use of antitoxin by the mouth.

Dr. McClintock, of Detroit, presented a paper last spring at the American Medical Association meetings in Saratoga, in which animal experiments showed that antitoxin could be given by the mouth with good results in a small percentage of the animals used, and especially when bi-carbonate of soda and certain other chemicals were given before or with the serum. Good results were also obtained by the use of rectal injections of antitoxin. That method has been used by several French observers, with, they have claimed, good results. However, the drawing of conclusions from a small number of cases is a very dangerous procedure, and it would hardly do at the present time to rely upon antitoxin being absorbed either from the rectum or from the stomach.

Dr. Smith—The purpose of my asking the question was—the last case in which I used antitoxin was a child three years of age, in a family where three children had died in the hands of a physician who was not acquainted with antitoxin. I was called in the night and saw this child, and knowing the history of the family, I took my antitoxin along. The child started out as the other three had, and I proceeded at once to inject the antitoxin, and as I inserted the needle the child gave a toss and the needle was broken off, and I don't think I got but a few drops of the antitoxin into the child; but I was determined that it should have it, and so I poured it down into the mouth, and by the time I got some more thirty-six hours had elapsed. That was the only child out of the four that recovered. I was not satisfied in my own mind as to the relative value of antitoxin administered by the stomach or hypodermically.

Dr. Pease—You were fully warranted in adopting that method in that case.

Dr. Smith—I have seen something in the journals about administration by the rectum. I did not see that paper you spoke of. I know it had been used some by the rectum, but that was the only case in which I ever used it by the stomach. I wanted to know if you had had any experience in administration by the mouth.

Dr. Pease—I have had no experience in that line.

Dr. Doughty (of Fishkill)—How much carbolic acid would be represented in say 300 units, in a prophylactic dose of antitoxin for a child—300 units which would be considered a prophylactic dose for a child, or say 500 units—that is easier to compute.

Dr. Pease—I may say that the amount usually added is less than one-half of one per cent. It would depend somewhat on the strength of the antitoxin; but in the case of serum containing 300 units of antitoxin in each cubic centimeter there would be about .005 of one cc., of carbolic acid in a dose of 300 units.

Dr. Doughty—We have had a very interesting series of cases in the Orphans' Home at Fishkill—that is the summer home of the Orphans' Home, which has its residence in the city of New York at Forty-ninth street. We have had a very interesting series of cases there, and a very interesting experience with them. If there were time I would like to make a statement of the cases we have had, their treatment, etc.; but I see it is very nearly six o'clock, and I doubt whether there is sufficient time remaining. If there is time for this paper, it will be short.

Dr. Pease—I will leave the matter to the chairman.

Dr. Johnson (in the chair)—How long will it take?

Dr. Doughty—Not long. There are two pages of statistics.

Dr. Johnson—It is getting late, but as this is a very interesting subject, if the gentleman will be brief we will hear it.

Dr. Doughty—The epidemic began something in this way: Fourteen children who were admitted to the Home in New York were isolated from the others. That is their plan, I believe, to isolate for a time those who propose to join the Home, and keep them under observation in order that no disease should be brought into the Home. These were isolated for the proper time, but it had escaped the physicians' attention that one of these children had some nose trouble. It was decided afterwards that this was a case of nasal diphtheria, and in that way these cases, they suppose, were introduced to the Home in New York. There were 131 children, 72 boys, 58 girls, in the Home in New York; ages three to twelve years.

June 6, 1902, the first case presented; culture made and proved, on June 10, to be diphtheria. From this time to July 8 nine cases occurred; all treated in Willard Parker Hospital, East Sixteenth street. July 18, quarantine raised. July 19, 129 children came to Fishkill; one detained in hospital in New York, joined them August 2. July 26, first case occurred in Fishkill. July 28, the case was reported to the health officer, and I quarantined the home at once.

The cases occurred as follows: July 26-31, seven cases; August 1-31, twenty cases; September 3-24, nine cases; October 1-24 (since which time no statistics have been given me), nine cases; in all forty-five cases—twenty-one boys and twenty-four girls.

August 18, prophylactic doses of 300 units each were given to all the children unaffected, about ninety. Of these thirty afterwards developed diphtheria. Some of these were treated with antitoxin.

September 6, fifty children were put on prophylactic doses of calcium sulphide. These furnished five recruits for diphtheria, viz.: 9th, one; 12th, one; 24th, one; October 14, one; 24th, one. Practically here only three should be counted because it is evident that those of the 9th and 12th were already infected when prophylaxis was being practiced.

In the nursery in New York, twenty-two received prophylactic doses of antitoxin. These furnished nine cases of diphtheria to the Fishkill home. Six cases of reinfection occurred, four from the Willard Parker Hospital patients, who had been treated there with antitoxin, two from those treated in the Fishkill home with calcium sulphide.

All cases treated in the Fishkill home received sulphide of calcium; some of them quinine, if malaria was suspected; iron and chlorate of potassium mixture in a few cases, and all were treated with local applications and sprays, hydrogen peroxide, aqua calcis, etc., and some were treated with antitoxin also.

One death occurred, and it was no more than fair to say this case received antitoxin treatment. All use of antitoxin in treatment and prophylaxis was strictly secundum artem. All antitoxin was furnished by the New York Board of Health. Cultures were mostly made in Albany, and the Bender Laboratory, I think, examined nearly all the cultures. Cultures were made from the throats of these children to be sure that they were cases of diphtheria. Part of these children have been sent home; there are some still remaining.

October 25, seventy-five were immunized with each 500 units of antitoxin, from the New York product. None were returned to the New York home, except those who were found free from the diphtheria bacillus.

That is, in brief, a statement of the conditions as we met them at Fishkill.

Dr. Pease—I have heard of the series of cases Dr. Doughty speaks of, and I am sure they are very interesting.

At Craig Colony there were 160 persons previously exposed to diphtheria, 500 units of antitoxin was given in each case without any of them contracting the disease afterwards.

The Willard State Hospital statistics, I am sorry I have not with me to-day. They have had two or three years' experience with antitoxin as an immunizing agent, and I am sure when their report comes out, it will be of a very interesting character. It has not arrived yet, so I cannot refer to it definitely.

Dr. Johnson—If there is nothing further to be said on this subject, as it is getting a little late, we will proceed to the reading of the next paper. This is a very interesting article of Dr. Doughty's relative to his experience with the cases of diphtheria that he has just recited.

The next paper on the list is that on Food Preservatives, by Professor Tucker.

FOOD PRESERVATIVES; THEIR USE AND ABUSE

By Willis G. Tucker, M. D., Director of the Bureau of Chemistry, New York State Department of Health

Mr. Commissioner and Gentlemen—When during the army beef investigation, the phrase "embalmed beef" was coined, it undoubtedly expressed in concrete form the abstract conception entertained by many people that our common foods are largely subject to chemical treatment. So frequently do we see in print statements concerning the use or abuse of preservative agents in the preparation of food articles, that many persons taking no pains to investigate the matter, or weigh the evidence, come to believe that most every article of food or drink that comes into our houses and goes upon our tables, is subjected to some kind of harmful treatment for the purpose of preserving it from taint, or improving its appearance. To enlighten the public is by no means an easy task and I have little hope that anything that I may say here will gain wide currency, or materially affect the popular view, but in addressing a conference like this, composed of health officers and others particularly interested in the matters relating to the public health, I assume that I am speaking to those who desire to form reasonable opinions, and such as are based on facts, and who are not disposed to be led astray by everything that they read in the newspapers, and so I ask you to consider with me for a few moments this matter of food preservation, and trust that I am not too sanguine in hoping that we may be able to reach some sure ground, having foundation in fact, on which we may stand with a sense of security. It certainly behooves the physician and sanitarian to know, at least in so far as they may be readily ascertained, what are the facts in these departments of knowledge in which he assumes to instruct and advise the people. And in order to ascertain these facts he must obtain his information, so far as possible, at first hand, and from those competent to speak with authority, and not from the anonymous and irresponsible purveyors of sensational diatribes whose deliverances appear frequently in the newspapers and occasionally in periodicals of high standing, but these articles are conceived in ignorance, or inspired by some ulterior motive. And then, when the facts have been ascertained they should be weighed with judicial fairness if conclusions are to be reached which lay claim to respectful consideration, or upon which advice to the uninformed is to be formulated. And I need hardly say that a neglect of these seemingly self-evident considerations is responsible for much of the confusion of thought, exaggerated statement, and some of the proposed and enacted unwise legislation, which has misled the public and retarded the progress of sanitary science in certain directions.

And first of all let me urge that we cease opposing methods of procedure merely because they are new. Many of us are prone to look back to the old times too constantly, as if newer light had not come in with later years, and seemingly forgetful of the fact that humbugs and makeshifts flourished in the good old days. We should not hesitate to adopt new methods merely because they are different from the old ones, and yet how many there are whose hide-bound prejudice is such that unless vinegar be made from cider, or fat for frying exclusively from the fat of hogs, they would regard the articles with disfavor if not disgust. On the material side at least the world is advancing, and pretty rapidly at that, and I am of opinion that there was never before a time when good food was so easily obtainable on the whole as at present. It is a mistake to say that the public like to be humbugged. They do not. They demand cheap goods perhaps as never before, but they want a fair return for their money, and no manufacturer can long put up and dispense of rubbishy articles, no matter how widely he may advertise, or attractively display them. And one great advantage that has resulted from combinations of capital, and the formation of great industrial concerns, is to be found in the diminished cost of production and the more uniform better grade of the output. The necessities of life, shelter, clothing and food, were probably never better, nor on the whole perhaps cheaper than to-day. And by this I do not mean that there is no substitution, sophistication and fraud, and, as regards foods, no objectionable processes of manufacture, for assuredly there are such, and not a few of them, but let us not be too ready to believe that all manufacturers and dealers are dishonest. Self interest, if no other motive, prompts them to put upon the market wholesome and innocuous goods if they can do so, and if some exigency, or seeming necessity of trade, forces them to do otherwise they know full well that exposure means disaster, loss of business or the destruction of it. In stating this view I do not mean to emphasize it unduly, for in the matter of our food supply there are many evils which need exposure and demand correction, but would caution you against falling into the error of supposing that all our foods are liable to harmful adulteration and sophistication, and that the indiscriminate employment of objectionable flavors, colors, and preservatives is the rule with manufacturers. And let us remember also that we may often improve upon nature. If the color, appearance or flavor of an article can be preserved or improved by artificial treatment, without injuring its quality or introducing any harmful constituent, such procedure is entirely justifiable. The laundress uses indigo to destroy the yellow tint in her linens, and the refiner of sugar employs ultramarine for the same purpose, and one practice is no more objectionable than the other. And the addition of burnt sugar to deepen the color of new whiskey, and of annotto to heighten the tint of butter, may constitute a technical fraud, but such deceptions are both harmless and justifiable. These general principles need to be borne in mind when the employment of food preservatives is considered, which fact accounts for this rather lengthy preamble.

To come now to the matter of food preservatives, their use and abuse, we should note at the outset that the employment of such agents is no new thing. They were not unknown in the "good old days" to which we often refer, with the implication that all virtue in such matters was a thing of the past, and all vice a thing of the present. Few natural foods will remain long unchanged save under some extraordinary climatic conditions, and the preservation of food by the employment of salt and sugar, alcohol and vinegar, as also by processes of drying and smoking, dates from the earliest times, and it is to be remembered that salt, alcohol, acetic acid and creosote are chemical agents, possessed of antiseptic properties, so that if the use of such agents is to be considered unobjectionable we are not justified in asserting that the employment of all chemical preservatives should be condemned or prohibited by law. As a matter of fact, however, these familiar substances are not entirely unobjectionable, and the ill results that follow the continued use of salted meats is well known. Fruits preserved by sugar, as in jams and jellies, are not to be recommended in all cases, and ought never to be used in excess, and our prohibition friends, and many others, object to the use of such as are preserved by alcohol. Let us recognize the fact also that modern conditions make new demands upon manufacturers, and that the public insists upon being supplied with many food articles in fresh and palatable form, and without regard to season or climate, and also that such articles be supplied them at a reasonable price. The canning industry has oved of incalculable service to mankind, and modern methods cold-storage involving the artificial production of low temrature have been of scarcely less value. But other needs ist which it seemed essential to meet, and these have led the employment of various new chemical preservatives in rtain foods, and while some of these are probably comparavely harmless, others are employed with doubtful propriety, rtain of them are assuredly distinctly harmful, and the use such should be condemned and proscribed.

Among the substances which have been employed during cent years for the preservation of food, may be named, boric id, and its sodium salt or borax, salicylic acid and its sodium lt, benzoic acid and its sodium salt, potassulphuric acid d the sulphites and acid sulphites of sodium and calcium, ta-naphthol, formaldehyde, saccharine, the alkaline fluerids d bere-fluerids and silico-fluerids pyroligneous acid and abrasl or asaprol. Some of these substances have well recognized ses in medicine, and some of them are distinctly toxic, and think there can be little question that most of them may be armful if added in too considerable quantity to food, or to ny food in such manner that any considerable quantity will e consumed, but the quantity consumed will vary according to he nature of the article, and cannot well be arbitrarily fixed any satisfactory way. In other words much will depend pon the nature of the food and the manner of its use, so that r instance, the same relative amount of an article like salicyc acid would be much more objectionable in beer or wine, hich may be consumed in large quantities, than in an article ke a sauce or a catsup which is sparingly eaten as a relish. t is also to be remembered that the same agents which by reventing or retarding the action of micro-organisms prevent he decay of foods, are quite likely to interfere with the action f the digestive ferments and thus hinder digestion. I do not hink that we are warranted in asserting that this is necesarily true in all cases, but believe that we are entirely justiled in considering it probably the case in many instances.

And in any general discussion of this matter we must not lose sight of the fact that substances that may apparently be consumed without evident harmful results by adults, and persons in good health, may act injuriously upon infants, young children or invalids. But to what extent we are justified in establishing standards for goods in general, with special regard to children and invalids, is a question upon which opinions may well differ. Starchy foods are not suitable for infants, and saccharine articles should be avoided by certain dyspeptics, and diabetics, but neither starch nor sugar are deleterious, and so it may be said that the addition of formaldehyde to milk is a much more objectionable practice than the addition of salicylic acid to catsup or potted meat, because the former is largely used as a food for young children, and the latter are consumed in relatively small quantities, by adults and ordinarily by those in health. These facts are mentioned because in a fair discussion of this question they are entitled to consideration, and harm is done by these over-zealous enthusiasts, whose aim is to protect the public from every conceivable ill. Creosote is a poison, but the small quantity contained in our smoked meats is probably entirely harmless under ordinary conditions, although we would not recommend such foods for infants or all invalids. Copper salts in sufficient doses are toxic, but there are few if any well authenticated cases on record in which pickles containing copper have given rise to harmful results. The use of such agents is frequently unnecessary, and certainly not to be recommended, but we are not wise if we propose impracticable measures and urge drastic legislation in order to correct all such possible evils.

Let us now briefly consider the more important and largely employed of the preservatives which have been named.

Boric acid and borax have been used for many years, more particularly for meat, fish and dairy products. They are sold in bulk for this purpose, and are contained in many of the proprietary articles on sale as preservatives. These substances are ranked by many competent authorities among the least objectionable of their class. In 1900, Liebreich, of Berlin, published the results of an exhaustive investigation in a paper "On the Action of Boric Acid and Borax," his conclusions being that boric acid and its salts are practically without harmful effects upon man, and that they may be used as food preservatives within certain limits without injurious results. The fact to which he called attention that boric acid is a normal constituent of many plants, and that it is found in California wines, as shown by Baumert in 1888, and by the United States Department of Agriculture, is worth noting, but we have no time to describe his experiments, nor quote his conclusions at length. Chittenden and Cies, in their paper on "The Influence of Boric Acid and Borax upon Nutrition, with Special Reference to Proteid Metabolism," which appears in the *American Journal of Physiology,* 1898, vol. I, p. 1, and therefore preceded in appearance the paper by Liebreich, came to essentially the same general conclusions, and these papers are commended to the attention of those who are interested in this matter. In 1901, Professor Tunnicliffe, of King's College, London, and Dr. Resenheim, published in the *Journal of Hygiene,* a paper on "The Influence of Boric Acid and Borax upon the General Metabolism of Children," and as a result of direct experiment, came to the conclusion that both these articles are quickly eliminated, and therefore probably have no culminative action, and that neither of them in any way affected the general health and well-being of the children experimented upon. Vaughan and Veenbeer have recently reviewed these papers and published the results of certain experiments of their own (*American Medicine,* March 13, 1902), and are of opinion that the use of borax or boric acid as a preservative in cream and butter in amounts not exceeding one-quarter of one per cent. in the former, and one-half of one per cent. in the latter, expressed as boric acid, being the quantities specified in the report made in 1901, by the English Commission, appointed by the local government board, is justified both by practical results and by scientific experimentation, and that the dusting of the surfaces of hams and bacon with borax or boric acid, not exceeding one and one-half per cent. of the weight of the meat, is effective and unobjectionable, from a sanitary standpoint, and they state that meat thus treated does not become slimy because the preservative thus used prevents the growth of aerobic, petonizing micro-organisms.

Especial attention has been called to this matter because certain extremists advocate the absolute prohibition of these particular agents. I believe that this is unreasonable and inadvisable. For certain purposes, and within certain limits, they have uses and these should be recognized. I think that the English Commission, to whose report reference has been made, did wisely in recommending that the use of these substances in milk be forbidden, because, while in some cases they may doubtless be used without harm, and indeed with advantage, yet since milk forms so large a part of the diet of many children and invalids, its entire purity is certainly desirable. But in certain foods their employment should not be prohibited, though the commission acted judiciously in recommending that in all such cases the fact of use and quantity used should be stated by label upon the container. Nevertheless the present "agricultural law" in this state prohibits the sale of butter or any dairy product containing any preservative other than salt in butter or cheese, or spirituous liquors, in fancy cheese, or sugar in condensed milk.

Salicylic acid is one of the best known of the chemical preservatives and has been used since Kelbe, in 1874, after an investigation of its properties, suggested its employment for the preservation of South American meats for shipment to Europe. Kelbe perfected a method for its cheap production, which led to its very general use, and in 1880 it is said that not less than 110,000 pounds were consumed in France alone in the preservation of foods. Its use at the present time is not nearly so general, and yet it is still regarded by many food analysts as the chief agent of its class. Its employment has been condemned by many investigators, and its use forbidden in many European countries. It is now employed in this country chiefly in the preservation of fruit and vegetable preparations, such as preserves, jams, catsups and sauces, the quantity added to liquid preparations being about one ounce to 500 pounds, or say 60 gallons. Since the medicinal dose for an adult is from ten to forty grains, it will be seen that in an article like catsup, used as it ordinarily is, the quantity ingested would be but a most minute fraction of the minimum medicinal dose, probably not exceeding a fortieth of a grain. I am distinctly of opinion that its indiscriminate use should not be permitted, and that the recommendation of the English Commission, that no greater quantity than one grain per pint in liquid foods, or one grain per pound in solids, should be sanctioned, is sound, and that the fact of its employment should be stated upon all containers. I think that its use in wines, beers, and other fermented liquors, which has been very common, is decidedly objectionable, because these articles are often used continuously, and in considerable quantities.

Benzoic acid. This has been more or less used as a preservative for over twenty years, and its use would seem to be increasing, many manufacturers having substituted it for salicylic acid. In 1901 the Report of the Connecticut Agricultural Experiment Station showed that, out of 106 samples of catsup and Chili-sauce examined, eighteen contained salicylic acid, sixty-seven contained benzoic acid, while in 1897, salicylic acid was most commonly used. It is frequently used in wine, beer, cider, catsup and other articles compounded of fruit or vegetables, and occasionally in canned soups, meat and dairy products. Its medicinal dose is about the same as that of salicylic acid, but is generally regarded as less objectionable. In many cases it may perhaps be used with advantage, but its indiscriminate use ought not to be sanctioned. Thus if added to cider in the maximum quantity which has been recommended, a quart may contain as much as twelve grains, which is certainly a very excessive quantity.

Sulphurous acid. This is chiefly employed in the form of the sulphites and bi-sulphites of sodium, potassium and lime. Wine casks and vats have been sterilized for many years by exposing them to the fumes of the burning sulphur, and sulphite of lime has been employed in the preservation of cider for a long time. The medicinal dose of sulphite of sodium is from ten to sixty grains, and if foods are treated with amounts of these agents as large as sometimes recommended by those who sell them, quantities approximating the minimum medicinal dose would in some cases be consumed. Such amounts ought not to be permitted in food and, since little necessity exists for their employment, they may well be viewed with disfavor, and their indiscriminate use restrained.

Formaldehyde. The aqueous solution of formic aldehyde which is a gaseous body, has been used as an antiseptic under various names for seven or eight years. At the present time its use as a food preservative is mainly restricted to milk, but such use ought never to be permitted. It directly interferes with digestion, and there is abundant evidence to show that it renders the coagulated casein of milk difficulty soluble in the digestive ferments.

Reta-naphthol, or "hyere-naphthol" is another preservative that is used to a limited extent and should likewise be viewed with disfavor. It has some uses in medicine; possesses toxic properties; and its addition to food articles ought not to be sanctioned.

Saccharin under various names is very extensively used to sweeten food articles. It also possesses antiseptic properties. Its intense sweetness, as is well known, is such that a very minute quantity may replace a large amount of sugar, and its employment by diabetics as a substitute for sugar has been generally sanctioned by physicians. Its influence upon health has not been accurately studied as yet, but it is generally regarded as comparatively harmless in the quantities ordinarily employed. Nevertheless its use in foods has been prohibited in Belgium, France, Germany, Italy and Roumania, and its importation, except for medicinal use, and under prescribed conditions, has been forbidden in Belgium and Greece. A preparation of saccharin with sodium carbonate containing ninety per cent. of saccharine, has been used medicinally under the name of "saccharin-sodium" and given in capsules in doses as large as fifteen grains. It is said to act favorably in certain intestinal disorders, and to have no injurious effect upon the kidneys.

am inclined to doubt the wisdom of prohibiting absolutely ts employment in foods in the present state of our knowledge.

Flucrids. During recent years the use of various fluerids, ilice-fluerids, and bero-fluerids, has come into vogue. The oreign chemical and sanitary journals contain frequent refer-nces to them, and they are said to be made use of in this ountry, but the matter has not received much attention from merican chemists, and if used they have not frequently been letected. Sodium fluerid is now a commercial article, and is aid to be put up on an extensive scale for use as an insec-icide. It has been used in medicine more or less in doses of rom one-twelfth to one-sixth of a grain. Harrington in his 'Practical Hygiene," 1901, in referring to its use as a food reservative, says that, "so far as is known, sodium fluerid xerts no poisonous action, but its effect on digestion has not een thoroughly studied." On the other hand, H. B. Baldwin, n the Journal of the American Chemical Society, for June, 1899, gives a case of accidental poisoning resulting from this gent, which had been used by mistake for baking powder, in naking pan-cakes, which were eaten by six or seven persons. Some of these persons partook but sparingly of them, while ne man ate three or four of the cakes. All who partook of them suffered more or less, and the man died. There was vomiting in every case, and purging in most of them. In another case which he investigated, in which a similar mistake was made, it was possible to determine approximately the quantity of the fluerid ingested by four persons. It varied from one to nine grains, and these quantities produced very alarming symptoms in each instance, although recovery followed in every case. Baldwin found that sodium fluerid, taken by himself in doses varying from one-half a grain to four grains, produce nausea, salivation, retching and vomiting, and he concludes from his own experiments and a study of the literature of the subject, that this article belongs to the class of the less violent poisons. Ammenium fluerid is said to be sold for use in the preservation of beer, and to be employed in such quantities that a quart would contain over one-quarter of a grain. This quantity might well give rise to harmful results, and the use of those agents in such a quantity, or indeed in any quantity, ought not to be permitted. Heffelman and Mann reported in 1895 that a crystalline compound containing 85 per cent. silicon fluerid, and 15 per cent. ammenium fluerid was used in malt liquors, and wine in Germany. Dr. Fritz Schwyzer, in the New York Medical Journal for July 6, 1901, reports at length a case believed by him to be one of chronic fluerine poisoning, resulting from the use of beer in considerable quantities, which in his opinion, had been treated with some fluerine compound, but I am not inclined to regard the evidence in this instance, either medical or chemical, as entirely conclusive. Of sixty-seven samples of commercial food preservatives examined by the United States Department of Agriculture, and reported upon in the Year Book of the Department for 1900, two only contained fluerids, but there would seem to be reason for believing that the use of these compounds is not uncommon, even in this country, and the subject is one deserving of further investigation, and more consideration than it has as yet received.

Pyroligneous acid — Many years ago the use of crude pyroligneous acid for preserving meats as a substitute for smoking was suggested and its employment in one form or another has been revived of late. It has been sold under such names as "Liquid Smoke," and at a price far in excess of its real value. We are perhaps not justified in asserting that foods thus preserved are necessarily injurious but they certainly cannot be called "smoked" and should not be sold as such.

Abrastol — This substance, known also as Asaprol, being the calcium salt of beta-naphthol-sulphonic acid has been used in medicine in doses of from 15 to 30 grains. It possesses marked antiseptic properties and is said to be more or less used as a preservative, but has not often been reported as detected by analysis. It would seem to belong to a class of compounds, the use of which in foods should not be permitted.

In addition to the foregoing a number of other substances are made use of as preservatives, but there is no need to con-some time in enumerating them. And various combinations of the articles I have cited are sold under names more or less miseading concerning which unwarranted claims are in many cases made. Little dependence should be placed upon the statements of manufacturers that their goods are harmless; that they have the same effect on food as ice; that they can be used without violating the laws of any of the states, and the like. Such claims are generally either gross exaggerations or wilful misstatements.

And now the practical question remains how shall we so deal with this matter that the welfare of the public shall best be served. That the law regulating the food supply in different states should vary widely is indeed unfortunate and not only causes much confusion but unnecessarily restricts trade. But it would seem to be impossible for the federal government to deal specifically with the subject, although in the regulation of interstate commerce and by internal revenue measures some results have been accomplished. But I am free to say that I am not one of those who hold that the national government is justified in taking advantage of such powers as it possesses in those directions for the purpose of correcting abuses however great that, under the constitution, are left with the states to be regulated. It is well that the government should conduct investigations, collect statistics, and make recommendations to the people, and the work that has been done along these lines by the Department of Agriculture during twenty years past has been of the greatest value. To Dr. Wiley, chief of the Bureau of Chemistry of that department, high praise should be given, because the work which he has inaugurated, much of which has been most successfully carried on and part of it practically completed, has been an invaluable contribution to sanitary science and of very great practical value to the people. But it seems to me that direct legislation regulating food supply should be left to the states. The Bureau of Chemistry is about beginning a series of experiments with a view to determining the direct effect upon health of the ingestion of chemical food preservatives, for which purpose Congress has appropriated ten thousand dollars. Whether the results which may be reached in this manner will be generally accepted as conclusive is not at all certain, but that new light may be thrown upon many problems by the investigation is entirely probable. And I think that the Department of Agriculture is better able than the boards of Health in any of our states, or any commission yet created or proposed, to ascertain the facts in the case and to formulate legislation for the correction of existing abuses. And I believe that when a model bill regulating the manufacture, sale and use of food preservatives is proposed by this Department it will not be long before it will be enacted in most of the states.

In the meantime it seems to me that unnecessary legislation should be discouraged. The specific prohibition of certain articles not universally conceded to be harmful is unwise, and in this state unnecessary, since our present laws specifically forbid the addition to foods of "any poisonous ingredient, or any ingredient which may render such article (of food) injurious to the health of the person consuming it." Connecticut and many other states have similar laws, and under such enactments the vender of any article of food or drink containing any poisonous or deleterious preservatives may be proceeded against. I am entirely willing to admit that certain food preservatives are entirely objectionable and that their use ought not to be permitted, but until the time comes that chemists and sanitarians are more generally agreed as to just which substances these are it seems to me that there is little need of adding further laws to those already upon our statute books, which, as stated, not only forbid the general addition of any poisonous or injurious ingredient to any food, but specifically forbid the addition of various enumerated articles to wine, malt liquors and of any foreign substance whatever to milk, or of preservatives to dairy products save as heretofore specified. Two years since, in a report on "Food Colors" made to the then State Board of Health by direction of the Legislature, I took similar ground and advised against the specific prohibition at that time of any particular list of colors. Various European countries have done so, but it is evident that no such list can be complete, or t any time up to date, but must need constant amendment beause new colors are constantly coming into use, and since it s a legal maxim that " the exception proves the rule," the use of any particular color not forbidden would be permitted. No hemist, sanitarian or commission is competent to make such n Index Expurgatorius, nor is it possible to make such a one which would be complete, and I am of the opinion that a comprehensive law, which places the responsibility upon the manuacturer and dealer, and forbids the general use of harmful subtances, like the English statute upon which our food and drug aw was originally based, as are the provisions of the present Public Health Law, is better. This law empowers the Department of Health to establish standards, fix limits for variability, declare what articles shall be exempt from the provisions of the aw, and " make such regulations and declarations * * * as may seem necessary to enforce or facilitate the enforcement " of the law. If this principle be maintained frequent amendments to the law, and the enactment of new laws, are unnecesary; responsibility is fixed and public interests have no need o suffer. One addition to the existing statute however might probably be made with immediate advantage, and that is the equirement that in the case of every food article in the preparaion of which preservatives other than certain articles such as sugar or salt are employed, the fact of such employment and he quantity used shall be plainly stated upon the package. Such a law would doubtless be constitutional, would be just to all parties concerned and might be enforced. To require the manufacturer to state upon his labels the precise composition of his products has been declared in several instances an unconstitutional exercise of the police powers of the state.

Massachusetts has recently passed a law of this description, being chapter 341 of the laws of 1901, providing that " every article sold as an article or ingredient of food or drink that contains any added antiseptic or preservative substance, except common table salt, saltpetre, cane sugar, alcohol, vinegar, spices, and in smoked foods the natural products of the smokng process, shall be deemed to be adulterated within the meaning of chapter 344 of the acts of the year 1897, unless every package of such article sold or offered for sale bears a label on which are clearly indicated the presence and the percentage of every such antiseptic or preservative substance." And it is further provided that "the foregoing provision shall not apply to such portions of suitable preservative substances as are employed as a surface application for preserving dried fish or meat, or to such preservative substances as exist in animal or vegetable tissues as a natural or component part thereof, but shall apply to additional quantities." I believe that this law meets with general approval, but as it only took effect on the 1st of last January, and as goods held in stock prior to that date are exempted from its provisions during the first year of the operation of the act, it is too early as yet to say how effective and satisfactory it will prove in practice. But I believe the principle to be sound, and it is in line with the recommendation of Dr. Wiley in the Bulletin on Foods and Food Adulterants of the United States Department of Agriculture, Part VIII, Canned Vegetables, 1893, who says, after expressing the opinion that "the use of added preservatives in canned vegetables is objectionable," that "this conviction, however, is not strong enough to warrant the absolute inhibition of these bodies, but the consumer would be sufficiently protected if the law should require that on each can of preserved vegetables a statement should be found as to the character of the preservative used, and the amount of it which has been added."

In conclusion allow me to say that I have endeavored to state such facts as have been adduced as correctly as possible. For any conclusions drawn from them, or opinion expressed, I desire to be held solely responsible, not having undertaken to speak directly for the Department of Health.

Dr. Johnson (in the chair)—That is a very able paper.

Dr. Lewis—Owing to the lateness of the hour and the importance of the subject of Dr. Tucker's paper, I would move that the discussion be postponed until to-morrow morning, if Dr. Tucker will consent to be present at that session.

Dr. Tucker—I will be here, sir.

(Motion put and duly carried.)

Dr. Lewis—The first paper this evening will be either Prossor Fox's, with his lantern slide illustrations, or Mr. Herig's, who also has stereopticon illustrations of his paper. Both apers will be read this evening, and probably Dr. Curtis' on accination.

Adjourned to 8 p. m., October 30, 1902.

Evening Session

THURSDAY, *October* 30, 8 p. m.

Mr. Rudolph Hering, C. E., New York city, delivered the folowing address on

ARBAGE DISPOSAL IN SMALL CITIES AND VILLAGES

MR. CHAIRMAN, LADIES AND GENTLEMEN—As communities grew t became necessary to abandon the old way of water supply from the pump, and in order to get a good supply for the entire community it became necessary to stop throwing the waste water out in the back yard, on the surface, and to establish a system of sewers, and it also became necessary, instead of throwing the solid waste matter of the city away, to have it collected and disposed of in a proper manner.

The water supplies and sewerage systems have been pretty thoroughly studied, and the solutions are fairly satisfactory. The disposal of the solid refuse matter, however, is still a question of some doubt and discussion. This is the subject upon which I shall have the honor to say a few words this evening.

The solid refuse matter of a community may be divided into three general classes: The first consists of the ashes, the second of general rubbish, dry rubbish, including sweepings, and the third the animal and vegetable refuse or garbage proper, otherwise called swill or slop. Let us examine these classes separately.

The domestic ashes we find, both here and in England, contain a large percentage of unburned coal, about twenty-five per cent in round numbers, and therefore the fuel value of these discarded ashes from the houses is quite considerable.

On the continent of Europe this is not the case excepting in a very few seaboard towns, and the fuel value of the ashes is very slight.

The ashes from some plants in a manufacturing town are of course the result of much more careful firing, and in those, in this country as well as in England, we find no unburned coal worth speaking of. The value of this refuse consists in its value for filling up land, making land, and certain of the ashes can have a value in allowing the unburned coal to be used for fuel purposes to assist in burning the other refuse. This ends practically what can be said about the ashes.

The next class consists of the dry rubbish and sweepings, paper, rags, wood, straw, leather, iron and other metals, glass and crockery, and sweepings of houses and streets sometimes. That makes up what we might call the dry rubbish of a city. This also has a value, as some of the ashes. It contains a great deal of material which, if taken out and assorted properly, can be sold, and in all large cities we have this sorting going on, either on the part of the municipality or on the dumps by Italians and others who pick out what they can sell.

The rest of this dry rubbish has no value and it is usually dumped the same as ashes or it can be burned, and it is found that, particularly in our country, its fuel value is considerable. The percentage of combustible matter ranges from sixty to eighty per cent. The danger that lies in this rubbish is the fact that it is liable under certain circumstances to contain infected clothing and infected dust, and it is therefore dangerous to health or may be so, and no other process of neutralizing this danger is practicable except its disinfection or its burning.

The third part of the refuse, which is altogether the most important one, is the animal and vegetable refuse, or the garbage proper.

The dangers that lurk in this material are due to the fact that a portion of it is very readily decomposable, particularly due to its large percentage of water, and the large percentage of ash-

:er. It contains about 80 per cent. of water in round sometimes more and sometimes less. It is character- offensiveness, if in summer it gets to be twenty-four l, or a somewhat longer period in winter.

ief danger, however, consists in its being subject to nd probably culture some disease germs that may get :he house in some way through insects, flies, etc. The this material may be fourfold.

iginal, and still a common way, of getting a value out ırbage is to feed it to swine. This is done in a large of our country, particularly in New England, and also e. In our country in the small communities it is quite :o feed it, and this is also the most profitable method ing of this material. It therefore seems to persist, not our country, but in Europe, notwithstanding the fact opposed by health officers very generally, and also by

jections to feeding garbage to swine are several. One : is proclaimed to be somewhat of a nuisance.

'hen we compare this method with others we can not it is characterized by producing a greater nuisance st of the other processes of garbage disposal, and it seem as though it were an inherent necessity. The can only be a nuisance if it gets too old and if it lies :he fields where the hogs feed on it. If the garbage :ed promptly, collected daily, and if the feeding places clean, there seems to be no reason why that should ι nuisance. At any rate we have to face the fact that hod is the most profitable way of disposing of the in small communities or in villages. And therefore it) persist, and it seems also that what we should do ıese circumstances is to regulate the character of this —not allow it to be collected infrequently, but to see process of conveying it from house to farm is speedy ɔer.

he second objection to feeding garbage to swine is that gerous to health, in so much as trichinosis is observed in swine that are fed with garbage. I am not of course in a position to talk about this subject as well as you are, but it seems that if the garbage is fed fresh to the swine there is no reason why it should cause trichinosis any more than if the swine are fed on other matter that is likewise fresh, and therefore it does not seem to me, an outsider, that this is a very serious objection, under proper restrictions.

The third objection is that the pork is claimed to be of poor quality. Now it seems to me this can be corrected in some way by frequent garbage collection and proper cleanliness in the process. There is no reason why the food should be of less good quality than other feed which would have to be provided for pork, instead of the garbage.

Therefore, so far as I am concerned, from my observation as an engineer, it seems to me that, in small communities, villages, there ought to be no serious objection to disposing of the garbage by feeding it to swine, because in a small city you can have better control of it than in large cities, and the hauls being shorter, the material will always be fresh, and therefore in a better condition. I do not think that this is a proper method of disposal of the garbage of large cities.

The next method of garbage disposal is to extract its grease and convert it into a salable product.

In Europe this process is not employed anywhere. There is but little grease in the garbage over there to make it profitable, and they also think that it is not a sanitary process because, in order to conduct such works in a populated district requires such an expense that it is not an economical process, although in our country we have a different experience. In a large number of the largest cities we have tried this process and it has been given up in quite a number, but there are still others, and particularly among the largest, that use this and seem to use it to advantage, as New York, Boston, Philadelphia are the three most prominent examples to-day of the largest cities.

The process consists of boiling the garbage and in that way getting out the grease. What is left, the so-called tankage, is disposed of in various ways. It has very little value and practically the entire income results from the sale of grease.

another method of disposing of this garbage is by its ion. This is the common method of England, and it is thod most generally advocated in our own country.

advantages of cremation are great. It destroys absothe disease germ, it destroys all putrescible matter, and reduce the cost of destruction by the production of although it is not done everywhere, and done at a very ıces in our own country.

objections to cremation of garbage are several. The odor he incompletely burned ashes is the first. We have that ›nce in most of our crematories, we find incompletely ashes in the dump, and the subsequent decomposition t, fish, etc., sometimes causes considerable odor.

remedy for that can only be, in my opinion, the employ›f a more intelligent class of firemen. It is usual to apıny one who can shovel coal, also to shovel garbage into ıce. Now coal is a uniform homogeneous material; garbone of the most heterogeneous masses that we find in a d community, and it is difficult to fire it, and therefore es skill; and it seems to me that one of the chief reasons ur crematories have given trouble is in the supposition nybody is good enough to fire it. It requires experience, nd constant attentive observation. For instance, here a load (as I have seen) of paper, wood and straw. It is d in upon the fire. Then comes a load of some kitchen e and it is dumped upon this fire. There you get a good stion generally, but I have also seen the reverse: First a load of wet, very wet, slop and garbage from kitchen . That is put into the fire; it practically puts out a large n of it, and then upon this is dumped the paper and and readily combustible matter, and that practically has tely no fuel value to burn the material that is below it.

›ne of the chief things to do in operating a crematory is np the material in the proper order so that you get the nefit of its fuel value.

next objection to the use of a crematory has been the ınd the burned as well as the unburned particles escaping from the stack. If the draft is not properly regulated, a large portion of this matter will go out through the stack. The dust of burned garbage will go out (properly burned garbage) and it will settle in the neighborhood and cause complaint. Some pieces of burned garbage, black paper, and so on, will come out of the stack and float around and settle in yards or go into windows.

The worst, however, and most serious trouble is when unburned particles escape from the stack and settle, and when the odors which generally go with it escape from the stack and travel, like invisible clouds, in masses, sometimes a mile before they reach the surface of the ground, and are there perceived.

Now the remedy for this condition requires two things: The first, I believe, is a better design of the furnaces we have here so as to effect a more complete combustion, and secondly a better manipulation of the furnaces—the manipulation of charging the fires, and of discharging the ashes and so on, and largely of regulating the draughts.

Now, the better design of the furnaces: We will see upon the screen two of these furnaces after a while, in which I can explain perhaps these points better than now, but I will say at the present time that we, in this country particularly, lack in many places what is called a dust damper between the furnace and the stack. A dust damper is necessary for the purpose of reducing the velocity of the gas by having it go through a wider space, and by that reduction of velocity, dropping the heavy matter, the dust and larger particles. It is a sort of settling basin for the solid material.

In England we find these dust dampers in every furnace. I have in our country seen but a few. If the flue is of uniform diameter the current is about the same, and whatever passes away from the fire goes up in the chimney, but if it is intercepted by this large dust damper you will see an accumulation of the dust—in England sometimes they have to clean it out once a week; and that is the stuff that causes trouble in our country, very often in getting into houses.

The next point is that you need a sufficient number of dampers. I have seen a number of furnaces here where they had only one damper, right at the chimney. Now when they open he door to stoke the fire, or to put some coal onto the fire to better its burning, or when they open the funnel and put in resh garbage, they change the draughts naturally, because here is an opening and the air immediately draws in, gets into he fire and it goes very quickly and takes away the particles up the stack, whence the damper controls the velocity of the gas in the flue and stack, and I have seen a number of cases where they paid little attention to operating these dampers properly. It is necessary to have more than one—one at the stack will not suffice. In addition to that there should be one at every furnace (if there are more than one), so that, if you open the doors of one, you shut the dampers of that one and et the other furnaces go on operating as usual. In other words, you must have the circulation of gas or air under control and then you will prevent the escape of these objectionable matters.

In order to have the assurance that no gases will go out, and no unburned material, it is customary in England and also n most of the furnaces here, to have auxiliary fires placed at the foot of the stack, so that all the gases that escape from the grates will pass over or through this auxiliary fire. That s a difficult mechanical proposition, and unless it is very carefully manufactured and managed, it does not do what is theoretically expected; and that also requires skill in the men who have to manage such a furnace.

Another feature of furnaces which has had very excellent results in Europe, is an increased draught caused by the introduction of air below the grate, that is an increase of oxygen and consequently a better burning of the garbage, and if a forced draught is used, as is done in most English cities, you get a much higher temperature and consequently you can in almost every case there, and in some cases here, manufacture steam by this heat, and the steam operates not only the forced draught, but it can light up the station, or it can handle the boxes from the carts and dump the garbage into the furnace and so on, as we will see on the slide a little later.

Now the last way of disposing of garbage is by ploughing it into the soil. That has been tried in most countries, and the advantages are that some soils are physically benefited by it. If you have, for instance, a very tough clay soil and plough in the garbage with all its heterogeneous matter, you loosen it up and increase its capacity for holding water, and thereby benefit the crops. It secures better drainage and the decomposition of the garbage matter raises the temperature in the soil, and that benefits the crops. And then we find that after the garbage has been ploughed in for a few years, it actually turns into the humus which we see in this black soil in the forests, and results from a decomposition of vegetable matter, principally leaves. The great objection to this way is in the great quantity of inorganic matter, like glass, pottery, etc., and the concentration of organic matter from the kitchen garbage, which must be well mixed up with the soil and other matter, and lastly the cost of ploughing the garbage into the soil is sometimes greater than the value obtained from it.

From what has been said it is evident that the three general classes of refuse have different qualities, and their best method of destruction or utilization may therefore not be the same. In some cases it has been found best to treat them separately and in others to treat them together. In many cities of Europe the three classes are burned together. Here we generally utilize one part or the other, and therefore frequently keep them separated into two or into all three classes, disposing of each one separately.

Animal and vegetable refuse in the case of small cities and villages, and from hotels and large institutions, is most generally fed to swine. In some of the largest cities we have reduction works, and get out the grease. In a large number of the smaller cities the garbage is burned. The combustible rubbish is also very largely burned, after the best parts of it have been picked out and sold, and ashes are dumped to make land. We know, however, that this treatment is not always satisfactory. The reason for this, I believe, lies in the fact that the necessary conditions are not sufficiently well understood, and they are not often ascertained, and the most efficient apparatus is not always used.

We know that all of the refuse can be hygienically treated, that is it can be effectually deprived of its objectionable qualities in one of several ways. It remains, then, to take up each town separately and ascertain the element of cost for each one. The cost should include that for the collection, for the delivery to the point of final designation, and for the final treatment in a satisfactory hygienic manner. The least costly method is, then, the proper one for the community to adopt.

Applying this method of careful investigation, it is found that in England the cremation of all three classes of refuse is generally the best, and the operation of the furnaces is in the hands of skillful men, and is satisfactory as a rule.

In Hamburg the same method is pursued, the plant being the largest in the world. We have a picture of it. In Berlin cremation is too expensive, and can not be used; there is insufficient grease in the garbage of that large city to pay for reduction.

In most of the cities of America we are still dissatisfied with the methods adopted, and changes are being frequently made. We have changed from cremation to reduction, and from reduction to cremation, and in some cases going back to feeding swine with it.

The solution of the difficulty in all cases lies, I think, in a more careful study of conditions, and of the cost of the different processes and in the employment of more expert labor to operate the works than has been thought necessary heretofore.

Now we will look at some of the lantern slides—carts and garbage wagons used for collection.

It is now pretty well established in our country that a very important part of the garbage question consists in the manner of collection, and the most approved method is to have galvanized iron pails in which to deposit it at the house, because all other means have become more or less a nuisance, and also using carefully constructed iron wagons for the purpose of receiving it and carrying it (with lids, etc., on) to the place of final disposal. Next.

This is a sample of the American furnace—that is, it is characteristic of the Dixon American furnace, and a great many of them have been built in this country. This is somewhat of an old style, and the later Dixon furnaces are somewhat better, but this illustrates their appearance in general. You see here is a flat grate, perfectly level in one direction and also level in the other direction. Over the grate are these openings, these doors through which the garbage is dumped down into the burning garbage below, so that if you dump a wet mass of garbage you put out the fire below, in almost every instance, and it has to dry out and get started again; and then they have a fire burning here, supplied with coal, the heat of which goes over the garbage and goes up into the stack, and thus sets the garbage afire and burns it up. The water is supposed to drop through here into an evaporating pan, or into that lower compartment, and another fire is kept going here for the purpose of evaporating this water.

Now, this is the other class of furnace, which is used in England; it is almost exclusively used there—I don't mean exactly the Horsfall Destructor, but simply one on this principle. There are three or four of them. Now here the characteristic is that the garbage is first dried outside, so that there is practically no water in it, and then it is dumped into a hopper and kept in there until it slides of its own accord onto this sloping grate, and as this is pulled forward and taken out as ashes, this hopper supplies fresh material.

This pipe shows the forced draft which is a feature of this particular destructor, and the doors are kept tightly closed and air is forced through here (indicating), and that assists the burning very materially. The hottest part of the fire is here. because it does not get burning until it gets into the lower portion of it, and where the flames are hottest the combustion is greatest. At this point the fumes escape at the top and then they go down this flue into the main flue, which acts as a settling chamber, and the dust drops down and the gas goes out of the furnace.

This is a smaller furnace, of a similar pattern. The garbage is dried on top, freed of its water, and it gradually gets down, like filling a stove, into the furnace; and there again we have the sloping grate, in distinction to our furnaces, which have a perfectly flat grate.

This shows the growth of cremation furnaces or destructors in England. I cannot read the year up there, it is not quite plain, but it is eighteen seventy something—the population that had its garbage destroyed was nothing, and then it grew up to be quite a considerable population in the last year there; and this is the total aggregate—no, this is the number of English cities that destroy their garbage in that way, and this is the population (see how it grows); and this is the great area of garbage crematories in England; and it is certainly the only principle which they think is economical and hygienic.

This is the largest crematory in the world—that at Hamburg, Germany. Here is the furnace building in which there are thirty-two furnaces; each one is about twenty-five square feet, and the heat created there gives steam to these boilers, and steam operates the entire plant—it takes up the box from the wagon when they drive up in here, takes the boxes by hydraulic cranes and dumps the garbage in, and then takes the box back to the cart. It also runs a cinder crusher, and the ashes, after being taken out of the furnace, are crushed there and the fine material is sold as sand for making concrete and the like. It also supplies sufficient power to run a pumping station not very far from it.

After six or seven years operation, the cost of operation of this plant the last year, I believe, was twenty (20) cents per annum per head of population whose garbage was treated there. In England the cost is about one shilling, twenty-four cents, per head per annum. So they don't consider that an exorbitant price, and this process is a perfect success in Hamburg.

This shows graphically what happened when they started the furnace. Here is the amount of coal that was consumed—you see they started with a good deal of coal. They had German workmen to fire the furnace, and that is what they did.

Now, at this time, they imported some firemen from England, used to garbage cremation, and the result was this (showing new slide). That is the way it runs now. The only coal that is used is Monday mornings, when they have to light the fires and start the combustion. Up to this time they had to burn coal every day in the week. After about four months, they didn't burn on Sundays, but rebuilt the fires every Monday. This is the quantity burned—January, February, March, etc.—you see they burned the greatest quantity in August, September, up to December.

This is a view of the garbage plant at Hamburg. It is at one end of the town, but there are buildings, and first-class buildings, in the immediate neighborhood. This is the building where the garbage is cremated, and here is the chimney. Here is the superintendent's house. This plant has demonstrated that garbage can be burned in a large city without causing a nuisance, and at no great expense.

Thank you, gentlemen, for your attention.

Dr. Lewis—Are there dust chambers in that Hamburg plant?

Mr. Hering—Yes, sir.

Dr. Lewis—That you consider the best of them all?

Mr. Hering—I think so, although I would not say that it is materially better than many in England; but it is the largest, and being very carefully managed by the city authorities, it makes a very good impression. There is no offense about it, as you do sometimes perceive in some of the English plants.

Dr. Lewis—How does their garbage compare in character with the New York city garbage?

Mr. Hering—It is very similar. It is different from the garbage in the interior of Germany, because being so near England coal is cheap, and they use it very freely and they have a large surplus of coal, which of course is a benefit in the burning process. The same cannot be done in the interior of Germany.

Dr. Curtis—I would like to ask Mr. Hering whether he favors the combination of common coal ashes and garbage, or whether he advocates separation. I think in Montreal they consume all of it, do they not?

Mr. Hering—They started consuming all together, and then they found that the fine dust in the ashes rather hurt the combustion, and then they sifted the garbage and got the fine ashes out, and burned the rest. But I don't think that plant is operated as well as the English plants are, although it is the same general construction of furnace, and the garbage is certainly just about as combustible as that in England, and perhaps more so; yet the results do not seem to be as satisfactory there, and I think it is due to the management. We have proved that the German firemen—I don't suppose they are particularly stupid, but they could not accomplish in Hamburg, with a well constructed plant, what the English firemen could that came over, that had to be imported—to get the thing working; and I believe that therein lies the secret of success in cremation. You require some intelligence and some special experience in that line of work. It is not an easy matter to fire a garbage furnace.

A Delegate—I would like to ask Mr. Hering a few questions. First, whether at Hamburg much of the refuse is made up of paper and straw, etc., that is mixed with the garbage. Second, if the price per capita per annum includes the cost of collection, or only the cost of cremation.

Mr. Hering—The twenty cents includes the cost of collection, and the rubbish, paper, straw, wood, etc., is included in the garbage; it is all sent there and burned.

Dr. Lewis—Any further questions? I am sure the conference is under great obligations to Mr. Hering for this interesting paper and discussion, and without putting it to a formal vote, I am certain that the thanks of the conference are hereby extended to Mr. Hering.

Mr. Hering—Mr. President and Gentlemen, I thank you.

Dr. George Henry Fox, Professor of Dermatology, Columbia University, exhibited eighty lantern slides, illustrating the various phases of smallpox and vaccinia on which the following discussion took place:

A Delegate—I would like to ask Dr. Fox one question—how he can tell smallpox from varicella, when it first begins to break out.

Dr. Fox—I can answer that very easily, by saying that, in certain cases, especially at the very outset, I cannot do so. If you have an opportunity of seeing the patient often, then in a few hours, upon thinking over the case alone, and taking all of the various conditions into consideration, you can often arrive at a correct diagnosis. Certainly you can if you wait a day, but there are cases in which all rules have their exceptions. There are some cases of variola, as you know, with very few lesions, and cases of varicella which will cover the whole body. There are cases of variola with prodromal symptoms, and cases of varicella with headache, backache and considerable fever.

There are indeed cases where you cannot make a positive diagnosis at the outset, and it is well for the physician, no matter how expert he may be, if he is in doubt, to simply say he cannot tell, then and there, what the disease may prove to be. He should quarantine the case and keep the patient under careful observation until he can say positively. He may get a reputation for being vacillating and ignorant, and a poor man for a health officer, but it is a great deal better than making an erroneous diagnosis and having it brought up against him for many years afterwards.

A Delegate—Could a child die from smallpox, without any eruption appearing?

Dr. Fox—Such cases have been reported, and I think it is quite probable. I don't know that I have ever seen such a case myself. In many cases of smallpox, where the fever is high and all the symptoms are marked, the eruption will be ery slight—I think of one case now, of an engineer at North rother's Island, in the midst of an epidemic in 1893, who com- lained of fever and quit work, and finally one of the doctors hought he would examine his skin, or happened to think that e might have smallpox, although he had been on the island r a long time; he found just two or three lesions upon his ody (he hadn't one on his face). The disease ran a typical urse in its different stages.

Dr. Fox—I think, during the pro-dromal stage, the danger of reading the disease is very slight—slighter perhaps than is enerally imagined. During the stage of early eruption, it is robably less contagious than during the vesicular and protular age, but most of all is the disease to be dreaded or feared, far as its contagious nature is concerned, during the process dessication.

A Delegate—I would like to ask the gentleman if he would ve the diagnostic points for measles, scarlet fever, chicken- ox, smallpox—the distinctions.

Dr. Fox—I fear I must ask the gentleman to excuse me. I ave made a mistake to-night. When I have spoken heretofore n smallpox or any other subject, and questions have been sked me, I have generally waited until the questions were in, nd then I have avoided the ones I didn't want to answer. he question is one which I would be very glad to answer to e best of my ability, if the time permitted. Here again I ill merely say that, while, in the books, certain characteristics ay be plainly set in parallel columns, they will not be of uch value in doubtful cases, the cases of which I have spoken being exceptions to the rules. These glittering generalities the text-book are of service. They give the student a good eneral idea of the disease, but when a physician is confronted ith a case where, as I say, it is exceptional and peculiar and regular, those general statements are often of very little alue.

A Delegate—I would like to ask Dr. Fox what will prevent itting.

Dr. Fox—I believe the antiphlogistic treatment of the eruption at its height, by means of cool applications is the only way to prevent pitting to any unnecessary extent. But pitting will take place where the pustules have formed and destroyed the skin, in spite of any plan of treatment.

I cannot discuss the treatment of smallpox at length. There are many statements made about the value of certain antiseptic and other peculiar methods of treatment, which experience does not always confirm.

I will speak of one as an instance. We all have great respect for Prof. Finsen, of Copenhagen, but I must say that I am inclined to take what he says now about the treatment of lupus with a certain degree of hesitation, remembering what he said about smallpox. He, or some of his followers, have claimed that with red lights in the windows of a room or smallpox ward, the disease would often pass from the early stage into the stage of convalescence without any pustulation or secondary fever, and that there would never be any pitting. This is a strong statement, and an important one, but is it true?

Sometime ago the Health Department in New York city took one of the smallpox wards on North Brother's Island, and put in the red lights, and the cases were treated in that way. It happened to be a mild epidemic that year, and I believe that few if any of the cases died, but they all ran the same course that others had before, and with the exception that it interfered with my photographing cases, I don't know that the red light treatment had any effect whatever upon the disease.

In writing to Dr. Edson, the health commissioner, at one time about that treatment, I asked him why he did not report the result, and he wrote me that if there had been any positive results he would have reported them. I regret that he did not report the negative results. When there is some new method advocated for the treatment of smallpox or other diseases, a few enthusiasts do all the talking and most of the writing. The men who try the new treatment and find that it is a failure rarely rush into print with this statement, and if they do print an adverse opinion it is not apt to be read by the profession at large.

A Delegate—I would like to ask, in those pictures that were shown, showing the eruptions of smallpox and the vaccination sore, did the vaccination have any influence upon the course of the disease?

Dr. Fox—In these cases I think it did not. I believe in every case of exposure to smallpox the person who has not been vaccinated should be vaccinated at once. I believe that on the first day after exposure (sometimes we can't tell exactly when the patient has been exposed) or upon the second or third day, it is probable that the vaccination will either prevent the development of smallpox or will greatly modify it. If you wait three or four days even, I am quite certain that it will have little or perhaps no effect in even modifying the disease, because in so many cases where vaccination is performed after the third day following exposure, we see the vaccine pustule and the eruption of smallpox progressing side by side.

Dr. Curtis—I just want to say that I imagine there are a good many here who have had more or less experience with vaccination prior to and following smallpox. I know that some have; I can see one or two here that I know have vaccinated and tested the efficacy of it, and the question as to whether vaccination will take after a case of smallpox—I would like to ask Dr. Fox as to this practical point: Is it not probably true that vaccination is effective in preventing smallpox only in the cases in which the evolution of the vaccinia is normal? This vaccine has a pro normal stage or period of incubation normally of three days. It seems in the old times when we used humanized virus it was uniformly so, but with bovine virus it is uniformly not so, and if you take it as far as time goes, it depends very much upon the evolution of the vaccine. If it is delayed beyond the period of time when it shall have reached the eighth day of its evolution, it will not prove a protection, supposing it to have been done almost coincidently with the exposure to smallpox. Some people have seen reason to think that that was the case—we can trust its protective value only in so far as we secure a normal initial stage or rather incubation stage, and after the sore begins to form on the third or fourth day, and so get its protective work in, it has reached the acme of the *lesion* sufficiently early to forestall the onset of the variolus fever.

Dr. Lewis—Owing to the lateness of the hour, I suggest that Dr. Curtis' paper on vaccination be read to-morrow morning. I was going to say, as the doctor arose, that I am certain that the members of the conference would be delighted to hear from Dr. Bryce. You heard what he said this afternoon about having received a certain number of our cases within his jurisdiction, and I think we would like to hear from him on the subject.

Dr. Bryce—Mr. Chairman, I have very little to add indeed to the very elaborate explanations of Dr. Fox, and there is only the one point that I would be glad to refer to, and that is the point our friend has brought up here with regard to the protective value of vaccination after exposure.

Of course all of us have had many opportunities of seeing the effect of vaccination after exposure at the different stages, but not very many of us have had the opportunity of trying elaborate experiments or experimental work which seems to explain how this protection proceeds from day to day.

I would be inclined to go very much further than Dr. Fox in believing and in fact seeing the protective effects of vaccination from day to day.

If one will remember that the incubation period of smallpox is from twelve to fourteen days and mature vaccine pock is present by the eighth day, it is quite clear that we have got four good days to work in during which we can perform the vaccination with a fairly good degree of certainty that we can protect against smallpox entirely.

In fact in a large number of vaccinations—in fact, fifteen years ago we marked the time very well and we got active vaccine—if we could vaccinate up to the fourth day after exposure we were reasonably sure of no serious attack of smallpox at all, and the reason seems to me to be this: In experiments made some four years ago it was found that the effect, the immunizing influence of vaccine virus injected beneath the skin upon a pock, or made by scarification on the surface, was marked from day to day very distinctly by the amount of immunization which went on from the previous injection.

For instance, we are told by Chambon that injecting active lymph to-day with a syringe, vaccinating to-morrow on the arm, the pock was complete in every detail and the lymph taken from it was perfectly active upon a calf or arm of a child. On the second day of the injection it was the same. On the third day it was practically the same, but the lymph taken from the pock vaccinated on the fourth day after the previous injection, while it gave a perfectly fair, round pock up to the fourth day, began to show the influence of immunization by the lymph from it being less active and indeed by the borders of the pock being less complete. On the sixth day vaccination of the surface produced a somewhat perfect pock, but the lymph from it was practically inert so far as vaccination upon a child or upon another calf went. Now there were six days during which injected vaccine has been able to produce an immunity so complete as to prevent the activity of the lymph which would appear in a pock on the surface.

Now it seems to me we have got in that, as well as a very large number of incidental experiments upon cats and monkeys which were made at the time, a very good idea of how far vaccine will prevent any serious effects from smallpox if we vaccinate up to the fifth or say the sixth day, because if our pock is perfect on the fourteenth day we have got all the immunizing influences which have been going on from the fourth day, when the first vessicle appeared, we have got four days of immunizing influence before the actual onset of the smallpox.

I have a great deal more faith in the immunizing influence even up to the sixth day than, I am sorry to say, my friend Dr. Fox has. We have seen so much of it that I can not help but feel that a physician ought to vaccinate when he knows he has passed the time during which he can prevent smallpox—he could vaccinate for the sake of immunity, which the vaccine even up to the eighth day is going to produce.

I don't care to speak any more, but this one question is very interesting, of how far our immunity is going to go.

Dr. Bracken—Mr. Chairman and Gentlemen: I have little to say after the very interesting talk you have had from Dr. Fox on this matter.

I only regret that the doctor has not shown us some of the more mild cases, but I presume it is exceedingly difficult to get photographs of some of these exceedingly perplexing cases we come across in our practice.

Another thing that I might refer to and that is some of the peculiarities in connection with the early history of the case. A gentleman asked about the distinction in the diagnosis between the different eruptive diseases, and Dr. Fox spoke of the manner of getting such a determination. I simply wish to give a little illustration of that difficulty. In the early history of our epidemic in Minnesota a man of probably fifty years of age came home from California with a rash that he supposed was, and some others called, chicken-pox—a very mild eruption indeed. In due time his wife was taken ill with a disease which was called by the attending physician measles, and a physician who was a competent man. The eruption was really one of these pro-dromal eruptions which may resemble either measles or scarlet fever. The diagnosis was changed from measles to smallpox. The wife died of smallpox which she contracted from her husband with this very mild type of the disease which had been thought of only as chicken-pox, a disease which had not confined him at all to bed. The doctor who attended that case was unfortunately a man who had not been vaccinated. When he made the diagnosis of smallpox in the case of this woman he stated that he had already been thoroughly exposed and he would quarantine himself with the family. He did quarantine himself with the family and in due time came down with the smallpox and died of hemorrhagic smallpox—giving you there three distinct lines of cases, one which would not have been called smallpox, the second, which the woman had, and the third, which was the type of hemorrhagic smallpox.

Another experience I had which was very interesting (I won't go into the experience itself), but these are a few cases which are illustrative. This was a case where a school teacher had a little eruption which nobody thought much of. She was boarding in the house with a young couple, and in due time the wife in this family had a very mild eruption which nobody thought anything of. The husband was taken ill and was ill two or three days—feverish, etc., and finally had a severe chill, and I think in two days after the chill he was exceedingly ill and a physician was called. He died shortly after the physician saw him—less than twenty-four hours after the doctor retired, and there was nothing to show on that man but a few spots. The physician made a diagnosis of the case as hemorrhagic smallpox, and I think the physician was right in his diagnosis.

I was very glad indeed to hear Dr. Fox state that these book descriptions of smallpox were all right for the student, to give him some idea of smallpox, but were not to be depended upon for the physician in attendance. If there is any disease that has a wide range of variations in its character smallpox is that disease.

I thank you, gentlemen.

Adjourned till 10.30 a. m., October 31.

FRIDAY, *October* 31, 1902; 10.30 A. M.

Dr. Lewis—The first order of business will be the discussion of Dr. Tucker's paper. It is an important subject.

Dr. Bryce—Mr. President and Gentlemen: The subject of Dr. Tucker's paper is one which, of course, to us in the northern centres especially, where fruit and other materials are put up in such large commercial quantities, is very interesting from a sanitary standpoint.

We, in Canada, have, through the Bureau of Internal Revenue, chemists engaged in similar work to that of Dr. Tucker, and we have from time to time their reports upon the various subjects which the doctor has included in his most valuable

From a sanitary standpoint, as one knows very well, and can see from the doctor's paper, it is a very difficult thing to get at. The answer to the question: "Do preservatives in food, as we ordinarily have them, affect seriously the public health?" We know that, in England, for the last ten years, this work has been gone into very thoroughly, and we have reports with regard to certain preparations, such as French peas, which show very clearly that certain dangers are present in connection with some of the old-time preservatives of that sort—the copper used in making the things green.

The thing that we are, after all, most concerned with, however, is whether the preservatives which are used in milk and butter and that class of articles are really of danger.

I agree, quite agree, with Dr. Tucker's conclusion that in the matter of milk there can be no question, from two standpoints, that preservatives should not be used. We all know very well that, leaving out the question as to whether formaldehyde, for instance, is a poison in milk which the children take, the much greater question is: "Is it possible to supply milk to the children and to ourselves and to the cheese factories and butter factories, in so good and natural a state that it will produce the best butter and food products." Supposing you think it possible that from a filthy or carelessly managed farm milk can, by preservatives be taken to a factory and there turned into a semi-presentable cheese, we see that the real evil lies in the fact that the people are permitted, or even encouraged, to be dirty. If they are dirty in the preparation of milk, they will be dirty in the handling of milk. There may be contagious disease on the premises. The people who are careless in one, will be careless in all these things; and we have found in our cheese factories (you know cheese is a pretty active factor in West Ontario), as one of our most prominent cheesemakers said at one of our conventions: "The factories to-day are not as clean as they were twenty years ago."

Now, if that is true—if the results are the production of gasey cheese, as they call it (cheese in which fermentation has gone on from the germs which promote putrefaction)—it is quite clear that sanitarians have got to take hold of the point of making the milk which goes to the factory so clean on the premises on which it is produced, that it may go without any preservative added to keep over night, or anything of that kind, and it will be in shape to not only be turned into curd, but will afterwards be so clear from contaminating germs that it can go into food products without any danger of producing the bad results which are seen here and there in cheese, even that is exported.

These are the most important things for us, in Northern New York and in Ontario: How are we going to have such an important item as milk and keep it clean? And I would say, apart from the poisonous effects of preservatives at all, it is infinitely more important that the cows be kept healthy, and the milking be done in a cleanly manner, and the milk put on ice and aerated. If it is aerated first immediately after milking, and kept say two or three days without any kind of preservative, except cold and cleanliness, it can be sent to the factory in a shape that will give the best results, as far as the products, butter and cheese, are concerned.

There is one of the most important points with regard to this whole question of preservatives—the allowing of the use of preservatives to cover up defects in the handling of the material. In some of our preserve factories, I know very well that they are using the pulp of the *fruits* (?), adding even, I understand, materials like ground-up turnips—adding a certain amount of that to the pulp of the fruits, and putting it into jars as preserved strawberries, or cherries, or whatever it may be.

Now, the work of such a bureau as that of Doctor Tucker is of infinite importance if we are to prevent the thing I have referred to. It is not so much the question of whether there is the presence of one grain or half a grain of salicylate of soda, as whether the materials put into the food in the first place come fresh, and prepared in a good, thorough manner, and that we shall have foods put on the market be what they are represented to be. I think we can all see the absolute necessity of legislation requiring, on the outside of every package, of every sort and condition, that they name in detail the constituents that are present. That is my view of it, Mr. President.

Dr. Lewis—Is there any further discussion? Dr. Bracken.

Dr. Bracken—Mr. Chairman and Gentlemen: I was glad to hear Dr. Bryce refer to milk again. In considering these food preservatives, we have to bear in mind other things than simply the preservatives used; and Doctor Bryce has well said that these preservatives tend to encourage filth, and it is rather that fact than the danger that may result from the preservative that we often have to bear in mind.

Doctor Bryce has referred to the possibility of keeping milk one, two or three days. It is well known that milk may be kept twenty-one days without any preservative whatever, if it is well collected—collected under cleanly conditions. During the Paris Exposition, a sample of milk was sent from this country that was of a normal character and showed no acidity until the twenty-first day. We know that milks are as carefully collected to-day and furnished to those who are traveling, and that they can be perfectly sure of a good milk for a number of days after it is collected.

In discussing these matters in courts, etc., this point is generally lost sight of; argument is nearly always as to the deleterious effects of the product. This we find emphasized in dealing with the baking powders. We are warned against alum in baking powder; yet it is very questionable whether there is any ill effect from the alum baking powder; but it does make it possible to make a very well-appearing bread from an inferior quality of flour.

It is not so much, then, the question from a sanitary point of view as to the danger—it is rather as to the quality of the food that is thrust upon us, from the possible use of the preservative, to improve its general appearance, its odor and possibly its flavor. These are the points we should keep in mind in arguing the question of foods.

From the commercial point of view, I consider this question of food preservatives one of the most difficult ones we have to deal with. You may suppress one; something else comes up very quickly to take its place, and it may be used for some time, unknowingly, or at least without knowledge, or it may be used under a different name, and you have to keep it under observation for sometime before you can suppress it, as you may have suppressed the same preservative under some other name in the past. I certainly think this is a most important subject.

Dr. Tucker—I don't know that I have anything especial to add. I quite agree with Dr. Bryce (I did not especially touch upon that point), that the use of preservatives may cover up uncleanliness of many descriptions, just as we often suppose, when we smell on a person too much perfume, that the perfume is used to cover up some lack of personal cleanliness.

In regard to milk I stated, I think, yesterday that our Agricultural Law absolutely prohibits the addition of anything whatever to milk in this state; so that milk is well covered. Nothing may be added to milk, of any description, under the Agricultural Law; so that we need no special legislation in that direction. I am of the opinion that the use of formaldehyde and other preservatives in milk should be discouraged and is objectionable.

The fact that preservatives may render palatable tainted food, as has just been suggested, is perhaps true, but is not perhaps an argument against their use in other instances, if they have a value of protecting from decay. That the use of agents like boric acid or borax upon salted or smoked meats has a distinct utility I think there is very little question.

As regards the use of preservatives in jams compounded from all sorts of vegetable material, of course this is general and these articles are upon the market. It is a question in my mind how far the public needs special protection—as to whether the state is called upon to guarantee the essential genuineness of these compounded articles. I think that the purchaser of house supplies, when getting strawberry jelly at a few cents a pound, in a wooden pail, knows pretty well the quality of the jam or jelly that he is purchasing; and just how far it is practicable or desirable there to protect the public against that kind of commercial fraud—whether that should be done through the stretching of our laws concerning adulteration is a wide question. I am not clear in my mind as to just how far the public need that kind of protection.

Dr. Johnson read the following paper:

DISINFECTION AND DISINFECTANTS

BY A. H. DOTY, M. D., HEALTH OFFICER, PORT OF NEW YORK

It is my purpose in presenting the subject of disinfection to deal with its practical side, and so far as possible indicate the modern method of performing this work and also to refer to the important advances which have been made in this direction during the past few years which have placed disinfection on a scientific basis and removed it from the domain of charlatanism. In the consideration of this subject it is necessary that we know the true meaning of the term disinfectant, which unfortunately is loosely applied and frequently confounded with antiseptics and deodorants. Although the definition of a disinfectant is variously and elaborately given by different writers, it is sufficient to state that all agree that a true disinfectant is an agent which destroys infectious organisms with which it comes in contact, whereas an antiseptic only holds in check the propagation of these germs, but does not necessarily destroy them, while deodorants neutralize offensive odors and may or may not act as germicides. A proper appreciation of this will make it clear to us that very few of the innumerable agents which are advertised and offered for sale as disinfectants have any definite germicidal value; the utter worthlessness of many of them has been confirmed by scientific investigations. We should bear in mind that one of the cardinal principles which governs scientific disinfection demands that no agent with which we are not familiar, or of which the strength and composition is unknown to us, shall be used as a disinfectant.

The pioneer work of Pasteur and Koch, which gave to the world conclusive evidence of the germ origin of many of the ectious diseases may be said to mark the beginning of scien-c disinfection. The rapid stride which has been made in cteriological work since that period (about 1880) has given means by which we have been able to secure definite facts garding this means of protecting the public health.

Experiments have shown that steam is the most valuable dis-fectant now in use. It not only quickly destroys all known thogenic organisms with which it comes in contact, but when operly employed has the power of penetration and disinfec-n not possessed by sulphur dioxide or formaldehyde. It is erefore the only agent we can safely depend upon in the gen-l disinfection of clothing, bedding, etc. The investigation rried on at the New York Quarantine Laboratory in 1897 owed that a moist temperature of 230 degrees F., with an posure of fifteen minutes, killed all organisms used in the rious tests, even when they were placed in the center of large d tightly rolled bundles. And in these tests the spores of thrax, which are exceedingly resisting, were destroyed. The portance of steam in public disinfection would seem to make imperative that every community be supplied with an appa-tus for treating presumably infected material in this manner. anticipation of this, instrument makers are now constructing am chambers of different sizes at prices which are within the ans of even small towns. The presence of a steam disinfect-t plant insures safety and economy; the latter because material ch as mattresses, etc., which cannot be opened and properly posed to gaseous disinfectants can be preserved.

Sulphur dioxide is a valuable germicide. The common rolled lphur from which this gas is generated is cheap (about 2 cents r pound) and can be found in almost every community, and is refore available at all times. The production of sulphur dioxide quires no special apparatus and one can be devised wherever washtub or metallic pails can be found—a most important nsideration. Sulphur dioxide is not only effective as a germi-le, but it promptly destroys animals, bugs, insects, etc. This of great importance in the disinfection of apartments where rmin and bugs exist, and particularly in the treatment of ships coming from plague infected ports, inasmuch as it is believed that rats act as a medium of infection in this disease. The destructive effects of sulphur dioxide upon mosquitoes renders it a very valuable disinfectant in the presence of yellow fever. The field which this agent has alone occupied for so many years as a gaseous disinfectant is now shared by formaldehyde, a gas which was accidentally discovered in 1868 by Hoffman, a German chemist, while heating a platinum wire over a lamp burning wood, or methyl alcohol. At that time formaldehyde received but little attention. However, it was afterwards investigated by Trillat, who in 1892 published a report regarding the disinfecting qualities of this gas, which is now known to be generated by the imperfect combustion of wood, or methyl alcohol. Since that period formaldehyde has received the most exhaustive investigation.

A comparison of sulphur dioxide and formaldehyde will show that both can be relied upon for superficial disinfection, i. e., where the material presented for treatment is opened and spread out, but they cannot be depended upon to penetrate; for instance, in the disinfection of such material as mattresses, bundles, etc. I am aware that statements have been made to the contrary, particularly with regard to formaldehyde, which it is said will penetrate and disinfect. It is true that this sometimes takes place, but this action is not constant, and therefore cannot be relied upon. Sulphur can be obtained in almost every community and an apparatus for generating the gas can be easily improvised; whereas, means of producing formaldehyde is at present not readily obtained outside of large towns. Sulphur dioxide is promptly destructive to vermin, insects, etc.; formaldehyde cannot be depended upon for this purpose. I have frequently exposed guinea pigs, rats, mosquitoes, bugs, etc., to formaldehyde for a long period without causing any serious injury to them. While sulphur dioxide bleaches, and is otherwise injurious to delicate fabrics, particularly material containing gilt, such as wall paper, etc., formaldehyde in no way affects these fabrics, but it may be used in richly decorated apartments without the slightest injury to the material contained therein.

In the disinfection of the skin, implements of all kinds, woodwork, discharges, etc., but two agents are now generally employed, i. e., bichloride of mercury and carbolic acid. In the disinfection of privy-vaults, cesspools, drains, air-shafts, cellars, etc., the preparations of lime are used.

The group of six disinfectants to which I have referred, i. e., steam, sulphur, dioxide, formaldehyde, corrosive sublimate, carbolic acid, and lime are practically all that are relied upon in modern disinfection. It is true that copper and zinc salts and other agents are used as disinfectants, but careful scientific investigation has shown that they have comparatively feeble germicidal power and are inferior to those already referred to.

Steam, sulphur dioxide, etc., are practically our own creations. There are disinfectants however supplied by nature, which in a general way are even of greater importance—these are sunlight and air. Bacteriological investigation has given us indisputable evidence that they are destructive to pathogenic organisms provided there is sufficient exposure; therefore, they become our most potent allies in preventing the extension of infectious disease. Not to recognize their value in public sanitation means that our efforts in this direction will as a rule be unsatisfactory.

It would seem hardly necessary for me to state that the use of steam, sulphur dioxide, or formaldehyde in sufficient quantities to insure the disinfection of an apartment is entirely incompatible with human life, and that proper disinfection can be performed only after the removal of the patient. However, we still find instances where attempts are made to disinfect a room while it is occupied by burning a little piece of sulphur, or the release of a small amount of formaldehyde, or by placing saucers of carbolic acid about the room, or the spraying of the apartment with so called disinfecting solutions. These are worse than useless inasmuch as they not only do not disinfect the room, but interfere materially with the comfort of the patient. All of such efforts combined would not equal in value good ventilation.

The disinfection of an apartment may be very much simplified if certain details are carried out in the beginning, and during the treatment of a case of infectious disease. If practicable the patient should be placed in a room divested of carpet, hangings, etc., and containing as little furniture as possible. If a diagnosis is not made until late in the disease, it is not advisable to transfer the patient as the change at this time would involve a thorough disinfection of two apartments instead of one; besides, at this stage, the propriety of moving the patient may be questionable. However, if the infectious character of the case is suspected in the stage of invasion, or very early in the disease, the patient should be removed to a room properly prepared for the purpose, while the room first occupied need only be treated with sulphur dioxide or formaldehyde, in addition to the special disinfection of bedding and clothing besides ventilation; i. e., it is not necessary to remove carpets, hangings, etc.

From the beginning great care should be taken to thoroughly ventilate the apartment of the sick. This not only aids in destroying infectious material, but goes far towards bringing about a favorable termination of the case. During the outbreak of typhus fever, which occurred in New York city in the winter of 1893-94, it was found that the most favorable results were among the cases kept in tents outside of the hospital, and freely supplied with air. However, within the house some forms of ventilation can always be devised, which answer the purpose and does not imperil the patient. All discharges should be promptly disinfected by receiving them in receptacles containing a large amount of a disinfecting solution; either a 1-500, or a 1-1000 solution of bichloride of mercury, or a five per cent solution of carbolic acid. It is believed that carbolic acid is better for the disinfection of typhoid stools than bichloride, inasmuch as the corrosive sublimate combines with the albuminous matter of feces and prevents free penetration. I am not satisfied that this is wholly true, and I believe that further investigation will show that the free use of a bichloride solution with exposure sufficiently long to dissolve the fecal matter will disinfect the discharges of this disease (typhoid fever). In connection with this detail I must say that the disinfection of stools as it is ordinarily performed in the sick room by nurses and helpers is only of doubtful value. This is largely due to the fact that its importance is not understood; that sufficient exposure is not made, and enough disinfecting solution of the proper strength is not employed particularly if much effort is required in preparing it. Furthermore the burying of typhoid stools without disinfection constitutes a serious violation of the rules of modern sanitation.

All bed linen, dressings, etc., should be placed in a 1-1000 solution of bichloride of mercury, or a three per cent solution of carbolic acid immediately upon removal, and should be left in one of the said solutions for at least two hours. This material should never be stored away for future disinfection. If the above details are carefully attended to during the course of the disease, the danger of infection to those in attendance upon the patient is greatly diminished, and the final disinfection is more certain. At this point I wish to say a word in connection with the use of bichloride of mercury. Solutions of this agent prepared for disinfection in the sick room are commonly made by dissolving tablets of bichloride of mercury in sufficient water to make the desired strength. While this is a simple and fairly convenient method, I believe an easier, surer and more practical way consists in having on hand a 25 per cent stock solution of bichloride kept in a large glass receptacle with a conspicuous poison label; also a label stating the strength of the contents and a formula for making the different solutions needed. In this way it is only necessary to pour out a given amount of the stock solution into the receptacle containing the water. This does away with the time used in dissolving tablets, which constitutes quite an item when disinfection is frequently required during the day. Besides, I am not sure that the tablets are always properly dissolved and the water thoroughly stirred at each disinfection when this method is employed. The stock solution is more economical inasmuch as a 1-1000 solution of bichloride costs only one cent per gallon. In order to properly prepare the 25 per cent stock solution boiling water must be used and about 10 per cent of common salt dissolved in it before the bichloride is added. In preparing very weak solutions the addition of the salt is not necessary. Bichloride solutions should be used in wooden, glass or porcelain receptacles. If metallic vessels are used, a chemical change takes place and the material to be treated may be discolored. This also frequently occurs when the linen is stained with blood or discharges even when the bichloride is in proper receptacles.

Bed linen and other material may be disinfected by immersing in boiling water for an hour, or even less time. While this is a valuable means of sécuring the desired result, it is only practical and safe where the appliances for boiling water are connected with the sick room, and the disinfection is under the direction of some responsible person. It is unsafe and improper to send infected clothing to the laundry. Moreover, in disinfection by this means, it is a common practice to place the material in boiling water and allow it to cool and not keep up the required temperature. This does not constitute disinfection.

It is unsafe to regard any number of days or weeks as indicating the time when a patient suffering from an infectious disease is sufficiently recovered to be discharged from the sick room. In small-pox, scarlet fever, measles, etc., the patient is ready for removal when the desquamation, or scaling is entirely over and not before. This occurs at no stated period.

Before removal from the sick room, the patient, particularly one who has had an eruptive disease, should be thoroughly washed with hot water and soap, and afterwards bathed with a solution of bichloride of 1-3000, or placed in a bichloride bath 1-5000. The head should also be subjected to this treatment. After this preparation the patient should be supplied with a clean night dress and taken to another room where proper clothing is provided.

The treatment of the infected apartment depends largely upon the means we have at hand for this purpose. If modern apparatus is available, the bedding, clothing, hangings and other textile fabrics should be securely tied up in clean sheets and removed for steam disinfection. If unfortunately there is a carpet in the apartment it should also be removed for steam disinfection. By carefully rolling it up its under side, which constitutes a hitherto unexposed surface, will prevent danger

nfection while in transit to the disinfecting station. The
stead and woodwork about the room should be washed with
1000 solution of bichloride of mercury or a three per cent
ition of carbolic acid. The previous removal of pictures,
a brac, etc., simplifies the disinfection. After the above
ails have been carried out all windows except one, which is
d for the necessary exit and entrance must be closed and
led; the latter can be accomplished with narrow strips of
vspaper. These strips can be applied with ordinary flour
ite and afterwards easily removed. It is exceedingly im-
tant that these details should be observed as the efficiency
the disinfection depends principally upon having the room
de tight in order to prevent the escape of the gaseous dis-
ectant.

Either sulphur dioxide or formaldehyde may be used in the
infection of the apartment thus prepared. Their relative
antages and disadvantages have already been referred to.
the apartment to be disinfected is richly decorated with
ngings, wall paper, etc., it is advisable to use formaldehyde
ich does not bleach, or otherwise injure fabrics of any kind.
ereas in apartments which do not contain delicate hangings,
orations in gilt, etc., but are plainly furnished, and in school
oms, holds of vessels, etc., sulphur dioxide may be employed.
the latter is selected there should be four pounds of sulphur
rned for each 1,000 cubic feet of space. An apparatus for
erating this gas can be quickly prepared in the following
nner: On the bottom of an ordinary wash-tub two or three
cks should be laid, upon which is placed a milk pan, or some
her metallic receptacle to hold the sulphur. To protect
ainst fire the tub should contain sufficient water to cover the
cks and the bottom of the vessel holding the sulphur. For
e reason just stated the pan holding the sulphur should never
placed directly on the floor of the apartment. If it is im-
ssible to secure a tub, a metallic pail containing the sulphur
n be placed in a similar receptacle half filled with water.
ch an arrangement is not, however, as satisfactory or safe as
tub for the purpose above referred to. The sulphur should

be broken in small pieces about the size of a hickory nut; o this alcohol should be poured and ignited by dropping a ligh match on the mass. Care should be taken by the operator stand as far as possible from the receptacle at this time. sufficient alcohol is used this method of igniting the sulphur sures almost complete combustion, which is not obtained by use of a coal of fire, commonly employed. It is important t the pan should not contain too much sulphur as it interferes proper combustion. For this reason, if the room is large, or more receptacles are better than one. Recent investig has demonstrated that the presence of moisture is neces to secure the desired result from sulphur dioxide; this is vided for when considerable humidity exists and during warm weather, but in winter, when the rooms are closed are heated and dry, we should supply some moisture—o little is necessary. Some simple means can be devised fo purpose; for instance, boiling water over a gas or oil sto pouring boiling water from one receptacle to another i apartment to be disinfected. A very practical method of ing the moisture is the evaporation of water in a rece placed six or eight inches above the burning sulphur. instances the sulphur should be so prepared that it m ignited immediately after the steam has been supplied.

Formaldehyde is employed in many different ways. F stance an apparatus is in use by which the gas is releas heat from the commercial product, known as formalin co ing 25 to 40 per cent of formaldehyde. The gas from th paratus enters the apartment through a tube passed int key hole of the door, by this method the gas is rapidly su and the result more effective than when slowly produced. another means the gas is generated directly from wood al This, however, is a slow process and requires that the appa shall be left in the room until the disinfection is compl Tablets or cones of various sizes and shape from which fo dehyde is released by burning are in use. These have th vantage of cheapness and simplicity, and are easily han However, they also give off the gas slowly in the closed r

The advantage of a method by which the gas is rapidly produced and can be forced into the apartment by an apparatus operated outside is manifest. In this manner the entire amount of gas required for each disinfection is rapidly expelled from the apparatus; therefore the volume is greater and the germicidal effect presumably more pronounced than when the gas is slowly generated; besides, in the methods where the production of formaldehyde or sulphur dioxide is carried on inside the apartment, and not in view, something may occur to interfere with the production of the gas, this applies more particularly [illegible] formaldehyde. Unfortunately a formaldehyde apparatus which can be operated outside the apartment is complicated and expensive, but if it can be procured I believe it to be the [illegible]t satisfactory method now in use for securing formaldehyde [illegible]infection. Whether sulphur dioxide or formaldehyde is em[illegible]yed the apartment should remain under disinfection for [illegible]t hours. Great care should be observed in entering the [illegible]rtment at the expiration of this time as the gas still present [illegible]y prove very irritating to the respiratory tract. A wet [illegible]nge or towel applied to the face will prevent this, and gives [illegible]e to open a window and allow the gas to escape and fresh [illegible] to enter. It will be found that a greater length of time will [illegible] required to remove the irritating qualities of formaldehyde [illegible]n sulphur dioxide, and the use of ammonia which has been [illegible]ommended to neutralize the formaldehyde present has as a [illegible]e but a transient effect. The persistence of formaldehyde is [illegible]ticularly apparent when the contents of drawers, closets, [illegible] are not removed and spread out.

In small towns where it is impossible to secure the benefits [illegible] steam disinfection, we must depend upon sulphur dioxide or [illegible]maldehyde for general disinfection. It must be remembered, [illegible]ever, that neither of these gases will insure deep disin[illegible]tion. Therefore, whatever remains in the room must be [illegible]ead out and hung up. Clothes lines can be carried from one [illegible]e of the room to the other, and the material spread out and [illegible]d by clothes pins. The placing of clothing, etc., over the [illegible]ks of chairs will not suffice. Material soaked with the dis-

charges should be burned if steam disinfection is not av
or if it is impracticable to disinfect by bichloride of mer
carbolic acid. Mattresses can be saved after disinfectio
sulphur or formaldehyde if they have been previously c
with a rubber cloth, over which is placed a comfortab
sheet, provided of course no soiling is found. After th
fection of an apartment it should be well aired for a
forty-eight hours—a longer time may be required whe
maldehyde has been used for disinfection.

In the disinfection of cesspools, drains, privy-vaults, air s
etc., I can suggest nothing better or more effective than th
use of chloride of lime, or milk of lime. Care should be
that the chloride of lime is purchased in tight packages, o
wise its value is impaired. Milk of lime should be mad
adding one quart of freshly slaked lime to four or five quar
water. Air slaked lime should not be used as a disinfec
The free use of lime may be employed in the disinfection of
matter, discharges, etc., if carbolic acid or bichloride are
available. In these cases the milk of lime, or the chlori
lime in the proportion of eight ounces to a gallon of water
be used. Lime is also a very valuable deodorant.

As health officials we are occasionally called upon to neut
the very offensive odors which emanate from debris conta
the bodies of persons or animals destroyed by fire, fallen b
ings, etc., or in other cases where the decomposition of or
matter is in process. Although lime is valuable for this pur
it does not penetrate as easily or act as efficiently as bro
which I believe is the best practical deodorant we possess.
agent is sold in solution in tightly sealed bottles which
packed in whiting in tin boxes. It is intensely irritating t
respiratory tract and therefore it should be used with g
caution in order to avoid danger. In making a weak soluti
this agent to neutralize offensive odors, the unopened bottle
taining the bromine should be carefully dropped to the bo
of the cask or receptacle containing the water and then br
with a crowbar, or some heavy implement, and the content
the cask well stirred. For the purpose above referred to a b

f bromine should never be opened above the surface of the water. he addition of four ounces of bromine to sixty gallons of water generally sufficient to act as a deodorant although a stronger lution may be required. It can be distributed in no better way an by using for this purpose an ordinary garden sprinkling pot. his should be repeated once or twice during twenty-four hours.

In practical disinfection and in public sanitation, too little ttention has been given to the value of soap and water; for instance the scrubbing of the floor, walls and desks in school rooms, ombined with thorough ventilation, is I believe superior to the rdinary disinfection. Woodwork which is constantly used or andled, soon becomes greasy and dirty, and it is not improbble that this may protect specific organisms against the action a disinfectant. Furthermore, I do not believe that the value air and sunlight as disinfectants is fully appreciated and I am ite sure that modern sanitation will demand that these gents as well as cleanliness shall receive greater consideration our efforts to preserve the public health.

Dr. Lewis—We will not have the privilege of questioning the thor of the paper, but we have the privilege of discussing it in ll its phases. Is there any gentleman who wishes to speak pon the subject of this paper?

Professor Tucker—I am very glad that the doctor has called ttention to bromine. It has been for some time a great surprise me that manufacturers have not seen fit to put bromine up in me convenient manner adapted to this particular use. Broine comes ordinarily in heavy bottles which are not easily oken,—they can be broken with a crowbar. It is a substance at is not familiar, and it is not an agent that appeals particurly to the physician. Besides that, he does not know about omine. Bromine is cheap enough to use, and if it were packed thin glass bottles, these could be dropped to the bottom of an dinary barrel or tub or pail, and easily broken and stirred into ater, and a true disinfecting solution is at hand, which may used for a great many purposes. I am surprised that manucturers and dealers have not seen it to their advantage to put bromine in some such way, specifically for this purpose, and with directions upon the package, stating how it should be used. It would be of far greater value than the average commercial disinfectant, such as is generally sold, many of which, as Dr. Doty tells us, are of no value at all as real disinfectants.

Concerning chloride of lime, that very familiar and acceptable article, Dr. Doty makes reference to it at the close of the paper; I was a little surprised that he did not state more concerning its use for the disinfection of typhoid stools, seeming to prefer corrosive sublimate, although stating the objection to that agent which is well understood. If properly used, chloride of lime, or its solution, is a germicidal agent especially acceptable for just that purpose — the disinfection of typhoid stools. It is a surprising thing that this is not a more general practice — that many physicians are exceedingly careless in disposing of discharges of typhoid patients.

This paper is certainly one of very great practical value and interest to us.

Dr. Doughty—I wish merely to make an inquiry. We, as physicians and health officers, meet in domestic use Platt's chlorides. It is a very popular remedy, and it is vaunted by the papers. I believe it is a proprietary remedy — recognized as such. Is it of any possible use?

Dr. Lewis—I think Dr. Tucker could answer that — regarding the composition of it — better than anybody else.

Dr. Tucker—I should not like to make any reference to any of these largely advertised articles. Doubtless they have their place; most of them have some value, possibly — probably, some value. That they are exceedingly high-priced, when measured by their real value, I think will be conceded by everyone familiar with them. The sale of many of these articles depends largely on the extent of their advertising. I have no facts that I should care to state in respect to this particular article, just now.

Dr. Lewis—Chloride of zinc, isn't it?

Dr. Tucker—Yes, sir.

Dr. Goff—I wanted to ask a question about the disinfecting properties of copperas. Many physicians, especially in typhoid

:ecommend copperas. We have come to accept it as a ;hly good disinfecting agent. I want to know whether mistaken.

Tucker—Copperas is not a disinfectant of much value. ty well starts out by calling attention to the mistaken ong dealers and physicians very often of the terms, "anti-" "deodorants" and "disinfectants." Agents of the zinc)peras class belong particularly to the deodorizers. There) classes of these—those that act like charcoal, absorb- : gases, and those that remove the difficulty by com- ı with the ammonia and sulphurated hydrogen. eras belongs to the second class. They have some germ- ınd therefore some disinfecting qualities, but not much. cover up and destroy the products of decay, but they : markedly germicidal. ık that answers the question.

:urtis—It seems to me, Mr. Commissioner, that the ques- the disinfection of typhoid stools ought not to be left with the application of a so-called germicide, for I ques- ether it is possibly practical, except by actual destruction, fect satisfactorily typhoid stools; and it is an exceedingly ıl question, because our rural towns are implanted every with fresh seeds of typhoid material. what shall be done with them, after you have applied the · of lime or the carbolic acid? The prolonged use of ndoubtedly goes very far, if properly mixed with the l, to effect the destruction; but I think there is good reason hat, as used, the result is not final, and I think we should sight of what should be done with those discharges after mpted disinfection.

in the first place, they should be deposited where they by any possibility come in contact with any source of water. I would like to submit (and there are many here ,e large experience to draw upon) whether this is not e in the country. Take some point on the premises re- om a running stream, and digging a trench four feet deep, pour the material into it, and at once cover it tightly wit fresh earth and pack it down snugly.

It seems to me that we ought to consider at least the matt of what we should do with this material. Certainly the attemp chemically, to destroy these germs, and so destroy the diseas eventually, is very attractive, but I question whether we ev do it.

Dr. Burdick—We sometimes have typhoid in the winter, whe the ground is frozen so that you cannot dig a trench. What wi you do with the material then?

Dr. Lewis—You can always dig a grave in the winter. I invited Dr. Doty to read this paper, and had in mind largely the fact that we are very careless in our directions as to the carrying out of disinfection, and in most cases our efforts are ineffective.

Starting from the time when the cholera was supposed to be making its way into this port, where I saw passenger baggage disinfected by a sponge dipped into the disinfectant solution and touched to the end of the trunk when they went out (which I always deemed to be an incomplete way), it has always been so. We are always prone to say to the nurse: "You must disinfect each discharge, you know." "And what shall I use, doctor?" "Oh, carbolic acid." "Very well." And that is all we know about it. The nurse don't know how much to use, and we don't tell her. Perhaps we haven't any distinct idea in our own minds in regard to it. So Doctor Doty has gone into it carefully, and his paper is of great interest to me and to you.

I believe this is a weak point in our sanitary administration. Next to if not ahead of the question of diagnosis is this question of disinfectants and disinfection. Doctor Bryce, don't you want to talk to us on that subject?

Dr. Bryce—You have here Doctor Baker, of Michigan, who h given a great deal of attention to this subject, and I am sure y would be glad to hear from him.

Dr. Lewis—I had not noticed Dr. Baker in the house. W would be very glad to hear from Dr. Baker.

)r. Baker was invited to the platform, amid applause, and e as follows):

r. Baker:

r PRESIDENT AND GENTLEMEN—I had no thought even of ng here to say anything on any subject. I simply came here arn what I could and carry it back with me to Michigan. n't know how Doctor Bryce ever thought of calling me out his occasion, for he must have known that I have had no aration for speaking on this topic or any other at this time. ve been very much interested in what I have heard here, and ct to be still further interested.

ne point, referred to a moment ago, by the Commissioner, as he effect of disinfection in typhoid fever, has recently been er my observation.

n Michigan we have reports from the health officer of just t is done with regard to the chief communicable diseases, in- ling typhoid fever, and at the office of the State Board of lth we file the returns, and a day or two ago, at New Haven, esented to the conference of the State Boards of Health, a gram embodying the results of these responses to the ques- : "What should you do in this outbreak of typhoid fever," since you have called on me, I might give the result of that pilation.

Ve have the records there for a number of years, and the re- t was about like this: In those outbreaks of typhoid fever ere isolation of the patient and disinfection of all infected terial, including the discharges, and the disinfection of the m—where that was practiced there were just about one- rd as many cases and deaths as there were in those districts which those two measures were not enforced.

Vow, the statistics have not been collected and filed which l enable us to separate those two factors, isolation and dis- ection. That remains for New York or some other state n Michigan to perform if they wish, and it would be a very resting point. We are unable to give you the results of nfection and isolation separately at the present time; but, as I said, in those districts in which isolation and disinfection were both enforced there were, on an average, only about one-third as many cases and deaths as in the others, which I think is quite an important point; and I hope some state will take up the subject and investigate these two factors, and let us know how much was due to disinfection and how much to the isolation. I thank you for the opportunity of listening to the discussions here.

Dr. Willard, of Catskill—I would like to ask about the disposition of the stools and this disinfected material in places where they have a system of sewerage, where it is not possible or convenient to bury it as Dr. Curtis has suggested.

Dr. Curtis—Does the doctor refer to places where there is a sewerage system?

Dr. Lewis—Where there is a sewerage system.

Dr. Curtis—There is no other way that I know of except to throw it into the sewer in cities where those exist. The disinfectant in that case would not probably be the bichloride disinfectant, but carbolic acid, or, as Dr. Tucker suggested, chloride of lime. My impression is that for all purposes under these conditions carbolic acid is generally to be preferred, as more easy and more adapted to the conditions under which it is used.

Dr. Willard—I was very much interested in this very instructive paper, and very much interested in what Dr. Curtis had to say. Now, if we disinfect these stools of typhoid fever patients, why is it desirable to bury the stools and bury the residue in four feet of earth; and if it is necessary in the country, why not necessary in the city? If we have thoroughly disinfected these stools, what difference does it make what becomes of them?

Dr. Bullard—It has always occurred to me, that whenever you see a typhoid patient, especially in the country, the discharges have already been emptied into the common rural receptacle, the privy vault, and it seems it is a good plan to give that some attention. I have always made it a practice to use at article which has been referred to—the common stone me. It is cheap, and I tell them not to use too little of it, at to get a barrel, and if the privy vault is large, two barrels, ad dump it in and let it slake in there.

Even if you tell them to bury it the chances are that the ajority of the discharges will be emptied into the privy vault; nd if the privy vault has been treated in this way, it seems to e that if the attempt at disinfection is only an attempt that his will practically finish the job.

Dr. Finch, of Broadalbin—I would like to ask if it is not ood practice to allow the movements to stand a few hours efore disposing of them in any way. That has been my usual ractice.

Dr. Lewis—After disinfecting them?

Dr. Finch—Yes.

Dr. Lewis—Yes, sir.

Dr. Willard—In regard to those houses which drain into the egular sewer system, I have been in the habit for years of lways having the passages from the bowels taken in hot water, ith about one to five hundred corrosive sublimate, but really oiling hot — have the water put into the bed pan boiling hot. hen the movement of the bowels takes place into hot water, nd I have always felt that it was safe to put that into the rdinary drainage. I have never had any trouble from it. either have I ever known of any other case occurring along he line of the sewer from that house to the main sewer. I think hat having the stools hot has a stronger penetrating power, nd it is more rapid in its action.

Dr. Tucker—Don't you run a great risk of scalding the atients?

Dr. Willard—It gets cooler before it gets to the patient.

Dr. Goff, of Corning—I want to ask Dr. Wey, of Elmira, a uestion. Our sewers empty into the Chemung river, and lmira gets its water out of that river. They had one hundred ses of typhoid fever in Elmira, and they have charged us up ith it. I understand Dr. Wey says disinfection does not disinfect. If it does disinfect, why bury it? If it does not disinfect, why empty it into the sewer? We are charged up with the typhoid fever in Elmira.

A Delegate—There is one good point in emptying typhoid stools into the sewers — the city or town below that makes trouble and will make the people that do that put in a proper sewerage system and stop infecting streams. That is the only good argument in favor of putting typhoid fever stools into the sewers.

Dr. Lewis—You know Elmira has put in a filter for its water.

Dr. Bracken—It is an open question whether we shall make our streams the sewers, or dispose of the sewage in some other way. Of course there is some difficulty in disinfection, but ordinary typhoid stools are apt to be very loose in character, and if a good disinfectant is used and the stool is left standing for some time in such a disinfecting solution, it seems to me you can dispose of it fairly well.

I am quite of the opinion that if a typhoid fever stool is well disinfected, it need not be buried. I would rather have it on top of the ground than under after it has been disinfected, if it is put in some place where it is not readily accessible to a stream. The air and sunlight, which Dr. Doty refers to, will aid in destroying any material which may still be active.

I was much pleased with the general character of Dr. Doty's paper. This question is very important, and as Dr. Lewis says, we often give general instructions to the nurse, and very often they are given simply to a member of the family. That is even worse than giving them to a nurse — a nurse is supposed to know something about disinfectants.

I was a little surprised to note Dr. Doty's position as bearing upon sulphur dioxide, in comparison with formaldehyde. Of course, we understand that sulphur dioxide is not an active germicide in every state. Its action depends upon the amount of moisture present. The doctor stated in the latter part of his paper that it is not the sulphur dioxide that is acting as a germicide. The doctor made the point that formaldehyde would not destroy animal life and sulphur dioxide would, although that is an argument in favor of sulphur dioxide. That would not hold at all with me. I believe that formaldehyde is a more active germicide than sulphur dioxide. It depends largely on what you want to destroy when you choose one or the other of these products. Dr. Doty refers to the use of sulphur in ship disinfection — the destruction of rats. That is certainly a very important thing. In disinfecting ships we have in mind the destruction of the carriers of the disease, not always of the cause. For instance, with the plague, we are anxious to destroy rats. With yellow fever and our present knowledge, we are anxious to destroy mosquitoes. Sulphur dioxide will destroy both of these, but it would not destroy the known germs of disease when they are present.

As to the use of these two agents in the country, Dr. Doty says sulphur dioxide is more practical for country use than formaldehyde. I cannot agree with him. If formaldehyde is not properly used in the country, sulphur dioxide is not. The disinfection in the country is often left to the family, and the ordinary way, in my country, I am sorry to say, is for the farmer (?) to pass around with a little sulphur in a shovel, from one room to another. If that will disinfect a house, I have yet to learn something.

If you tell people that disinfection must be thorough and in the hands of those who know how to disinfect, then you can carry it out just as thoroughly and practically with formaldehyde in country districts as with sulphur.

Sulphur is certainly a very good disinfectant if used properly. You must have moisture. The doctor referred to the necessity for moisture—the very fact of his placing it in a tub containing water shows that. If he had put it in hot water to start with, that would help out decidedly.

I certainly am strongly in favor of formaldehyde in ordinary disinfection for infectious disease in country districts.

Dr. Doty also refers to tablets of corrosive sublimate, and suggests that the solution of it is cheaper and more practical. That is true with relation to hospital work; but it is not true in relation to general work outside. It is not convenient to carry this solution about, and it certainly is more risky to have a bottle standing about with a solution of sublimate, than to have some tablets that can be left with greater safety with ordinary people to use.

Dr. Lewis—Do you disagree, then, with Dr. Doty regarding the effectiveness of formaldehyde as to mattresses, etc.? He states that it is only the surface that is disinfected by formaldehyde.

Dr. Bracken—I am inclined to think that formaldehyde may have a little more penetrating effect than sulphur; but I certainly do not believe that you can get any great depth of disinfection from either formaldehyde or sulphur dioxide; but there is one thing that we must bear in mind, that if there is not a great depth of penetration of the disinfectants, there is also not very deep penetration from the infectious material, and often we can bear that in mind in carrying out disinfection. Of course, steam alone, or in combination with formaldehyde is one of the best disinfectants for penetration.

Dr. Pease—Dr. Bracken's remarks concerning the efficacy of formaldehyde are very well put, in my opinion.

I have spent some three or four years making actual experiments with both sulphur and formaldehyde, and while in the hands of inexperienced men the lack of penetration of formaldehyde is apparent, still, when properly used, there is absolutely no question but that formaldehyde does possess great powers of penetration. It will penetrate sixteen layers of blankets in ninety-five per cent of cases, where properly used, and as between sulphur dioxide and formaldehyde there is no comparison whatever, in my opinion.

Recent experiments go to show that the same amount of moisture should be used with formaldehyde as with sulphur. Sulphur dioxide, however, when moisture is used, will have a corroding effect upon metals and a destructive effect upon some fabrics. Where formaldehyde is used there will be no such injurious results.

A great deal of the lack of uniformity in the results obtained from the use of formaldehyde is due to the varying amounts of moisture present in the room to be disinfected. The bacteriologist of the Pennsylvania Railroad has been making experiments for two or three years on this point, and has found that a relative humidity of seventy-five per cent must be present before a constant uniform penetration of the formaldehyde will take place. When this amount of moisture is present the disinfection takes place rapidly and surely.

I would like to speak concerning the disinfection of typhoid stools. It may not be known to all of you that the typhoid bacillus is found in quite a large proportion of cases in the urine, as well as in the feces. The urine, therefore, should be added to the feces and disinfected, or disinfected separately.

The urine and feces of persons who have recently had typhoid fever often contain the germs of the disease for a long time, and disinfection should not stop with the recovery of the person, but should be continued for some days or weeks.

Dr. Bryce—Dr. Pease has been so good as to tell us about the qualities of formaldehyde. I am quite sure he would confer a favor upon the meeting if he would give us the definite method which he thinks best for the use of formaldehyde—if he could just tell us what is the best up to date, we would all be obliged.

Dr. Pease—There is no method that could be termed best. Any method which will produce the amount of formaldehyde gas required by the conditions existing in a given case, or cases, will produce thoroughly satisfactory results. The conditions under which one works will be different, and you will have to use the method best adapted to the conditions as they exist.

Where disinfection is to be carried on in a large city, with the apparatus belonging to the city, some one of the methods with large apparatus should be used. The different methods should be tested previous to the purchase of the apparatus, and the one selected, which the man who is going to do the work finds is the best suited to the conditions he will have to work under, should be selected.

There are also various methods of generating formaldehyde gas in a crude way. One of the best is to evaporate in the room from an open pan at least one pint of a forty per cent solution of formaldehyde in water, for every 1,000 cubic feet of space. This should be brought about rapidly and requires some sort of heating apparatus, which has no connection with a flue or chimney. A kerosene oil, gasoline or ordinary gas stove would answer the purpose or a large alcohol lamp would do. Rapidity of action is especially desirable. One pint to a thousand cubic feet of space is none too much to use when crude methods are employed. This open pan method also gives off a large amount of watery vapor, which is very desirable as I have already said.

I would not care to destroy any confidence which you may have in the value of chemical disinfection, but I would like to emphasize the great value of sunlight and air as disinfecting agents. I may say that certain experiments are being carried on in Boston at the present time, in which air and the indirect rays of the sun are being tested for their powers of disinfection. Tubercle and diphtheria bacilli have been killed very quickly in a large proportion of these experiments, under the influence of drying in the presence of sunlight and fresh air. We should, therefore, not only use disinfectants such as formaldehyde, but also sunlight and fresh air, and with the combination, there is no doubt that absolute disinfection can be accomplished.

Dr. Lewis—What I want to know is, if I have a room to disinfect, and I ask Dr. Pease to do it, just exactly what he is going to do with formaldehyde disinfection. I don't want to discuss some four or five different methods that will answer, but I want to know what he is going to do with my room, in a few words. What kind of an apparatus shall I get? Don't give me a choice of four or five, but tell me just what I want to get.

Dr. Pease—If I had only one room to disinfect, I should not get any. I would get a gas or oil stove or an alcohol lamp if you could not get either gas or oil stoves. Take an ordinary saucepan, and in a room containing 1,000 cubic feet, take one pint of formaldehyde and dilute it with twice the quantity of water, and then put the lamp up as near the saucepan as possible, to get the most heat from it, paste up the cracks in the room in a proper way, start the apparatus and get out.

Dr. Lewis—How long will that pint last?

Dr. Pease—The evaporation of that pint ought to take place in a half to three-quarters of an hour, depending altogether on the amount of heat generated.

Dr. Lewis—Must I go in and put out the gas lamp?

Dr. Pease—No; use a saucepan that you don't care anything for and let it burn. As a matter of fact, that is very desirable, for the reason that there may be some precipitation on the bottom of the vessel, when the polymerization takes place. What is left will be evaporated down to the very last particle. You would lose your saucepan.

Dr. Lewis—No danger of the house taking fire if it is left alone?

Dr. Pease—No; I think not.

A Delegate—Would you consider a tin basin a saucepan?

Dr. Pease—Any pan that did not leak would answer.

Dr. Lewis—Shall I open the room again after eight hours or twelve?

Dr. Pease—It would be just as well to leave it for twenty-four hours — that is, until the next day; but it can be opened in eight hours, with practically the same result. Where a large amount of moisture is present, the time element is not of any great importance. The disinfection will be accomplished in four hours, if enough actual steam is present in the room along with the formaldehyde gas. That point was worked out by the bacteriologist of the Pennsylvania railroad while experimenting for the purpose of obtaining a rapid method of disinfecting railroad cars. A car could not be economically kept in the yard for twenty-four hours, and it was desirable to have a method of disinfecting with great rapidity, and it was found that a very few hours was sufficient, when sufficient humidity was present in the air of the closed car.

Dr. Lewis—Would it make any difference as to the length of time you would keep the room closed, as to the disease you were dealing with?

Dr. Pease—I think not. The effect of formaldehyde on the micro-organisms of the disease of which we know the cause is about uniform. The typhoid, the diptheria bacillus and the various organisms of suppuration are killed by a given amount of formaldehyde gas in about the same time. With some few diseases which occur very infrequently, like anthrax a longer period of exposure to the gas would be of advantage.

Another method which may be used and which does not require any apparatus is that recommended and used by the Chicago Board of Health. It consists in hanging around the room on ropes bed sheets thoroughly sprinkled with the 40 per cent solution of formaldehyde in water. The sheets should be hung in such a way as to allow evaporation to take place from them in all directions. The same amount of solution should be used as when it is evaporated by heat, and the sheets should not be rendered so wet with the solution that it drips off from the lower edge.

In large rooms, stables, halls, etc., this method ensures a more even distribution of the gas than might be obtained by more elaborate methods. I have had no personal experience with this method, but it has been shown to be reliable by competent men.

Dr. Lewis—Dr. Wey has arrived, and is very anxious to answer that Corning question.

Dr. Wey—I have only a few words to say. I am very glad I have heard Dr. Pease speak as to the penetrative qualities of formaldehyde. I am also glad that Dr. Bracken has talked of his confidence in formaldehyde, because I have used it with a certain amount of success, but had some difficulty in convincing myself of its value as a germicide, and in regard to its non-use as an insecticide; but these points have evidently been cleared up through the statements the gentlemen have just made.

While there is much to be said in favor of formaldehyde, as there are also certain things to be said in favor of sulphur dioxide, but also there are strong objections as to the deleterious influence it has upon metals and also upon gilt articles, picture frames, etc., in the room, and also you can put a piano out of condition in a very short time where sulphur has been used. These facts being established, formaldehyde is preferable.

However, the point I wish to make is that, in spite of all these opinions, there are certain cases in which I feel that the whole duty has not been performed, and that we cannot have a reasonable degree of assurance of safety unless you go further, as in small-pox, and destroy everything in the room. That having been done, you are absolutely safe, and your disinfection has not been performed perhaps with the feeling of uncertainty and that later you may have trouble.

Dr. Bracken—If I may be excused for pushing your inquiry a little further, I would like to ask Dr. Pease still one more question. He has been good enough to tell us all about how he is going to clean up your rooms, and I know it needs it; but the question is just this: He is talking to us as health officers, and some of us come from country districts, where, as we saw yesterday, money is money. He has supposed that the saucepan is going to be thrown away. I want to know (I am a country health officer, and have to go from house to house), whether the doctor cannot supply us with a frying pan or old iron pan which is not going to be destroyed each time. Would it not be a practical point for the health officer to have his iron pan of a certain definite size and a stove of a definite size, and take it from house to house, so that even the cost of the pan will be saved.

Dr. Pease—There is no objection that I know of to an iron pan being used in such a case. Of course, if the heat is great the bottom of the pan will gradually disintegrate, and of course it is perfectly possible, where a person knows how to handle himself in a room filled with formaldehyde gas, to go in and turn off the gas.

A very good plan, if a man is doing much disinfection in a country district, is to use an alcohol lamp with several wicks, and put in the amount of alcohol which experience will show is sufficient to distill off just the amount of formaldehyde mixture he wishes to use. The lamp will then go out, when the fluid has evaporated. This alcohol lamp idea has been used by one or two large commercial concerns who manufacture apparatus for this work, and the method works very well.

Somebody has asked me about the use of formaldehyde candles. I have had no experience with such candles and cannot say anything definitely about them. I can say that any plan of generating formaldehyde gas where there is a flame coming in contact with formaldehyde will be very expensive and uncertain, because the flame burns the formaldehyde, and thus destroys at least a part of it.

A Delegate—I would like to ask Dr. Pease about solidified formaldehyde. I think there is an article on the market called solidified formaldehyde. I think there is a western firm which supplies this in sufficient quantities to meet the demands of any city of the second class, and they furnish with it a lamp with a receptacle in which this solidified formaldehyde can be used very inexpensively and very simply. The object of the apparatus is to simplify the use of the disinfectant. I do not understand just what the doctor means by polymerized formaldehyde.

Dr. Pease—Putting it roughly, formaldehyde is a gas; under some circumstances it comes solid; and we then say it is in a polymerized state. If you want to go into the chemical aspect of it, Dr. Tucker will doubtless give a satisfactory explanation. The actual composition of some of these solidified cakes of formaldehyde I am not in a position to state, but so far as I can say, their essential constituent is polymerized formaldehyde. There are often various other ingredients mixed with the polymerised formaldehyde, such as glycerine. Glycerine added to polymerized formaldehyde seems to be of some aid to the action of the gas after it is generated. Just what the correct explanation of its action is I cannot say, but actual experience shows that the addition of glycerine to such a mixture is of benefit.

The use of polymerized formaldehyde without the addition of moisture to the air of the room is certainly not productive of as good results as when moisture is present, and that is obtained of course when the aqueous solution of formaldehyde is evaporated.

Professor Tucker—The fact which has just been brought out points to a weak point as regards the use of formaldehyde. It has a tendency to form polymers, and the germicidal value of the polymeric modifications I don't think has been entirely established; so that it is probably quite possible that in the various uses of formalin these polymeric modifications, of which there are several, and which have doubtful germicidal action, may be produced.

Another fact which has not been brought out is that the commercial formalin which Dr. Pease has recommended is of very variable strength, just as we find that the chlorine preparations are of variable strength, and therefore of variable value; so it is with the formalin that is sold.

I quite agree with Dr. Pease that, properly used, formalin is a valuable germicide and true disinfectant, but in the practical employment of it I am inclined to think that there are as yet a good many difficulties in the way.

I think no reference was made in Dr. Doty's paper nor has the point been brought up in the discussion that the generation of chlorine is an energetic and valuable and easily applied agent for the disinfection of rooms and of material, of course, unoccupied rooms. But this, again, is subject to the same disadvantage that obtains in the case of sulphur dioxide, namely, its bleaching effect upon certain fabrics.

Dr. Bowen (?)—I have a case in point which I would like to ask a question about. Two cases of diphtheria occurred on the same mattress. The room was disinfected with formaldehyde by one of the generators ordinarily used now, through the keyhole. I don't remember just the quantity we used, but the room was carefully sealed, and at the end of nine days, when it was opened, there was still a formaldehyde odor in the room — enough to be noticeable and unpleasant. I ordered the mattress destroyed, but it was not done. About two months after that a child sleeping on that mattress was infected with diphtheria and came down with it.

I wonder if it is wise for so many of us from the country districts to go back home with the idea that formaldehyde will practically disinfect through several layers of blankets. I believe the proper thing to do with bed clothes and mattresses is to burn them, after such a case as that.

Dr. Cole—We have heard so much about the disinfection of discharges — I think discharges mean to most of us one thing. Now last winter I had quite a little experience with typhoid fever, with discharges from the mouth. A little son of a lady always had what mama had,. and the little boy got what mama had too, I would like to ask the experience of sanitarians about mouth disinfections.

Dr. Rood—In speaking of disinfection of discharges in typhoid fever, I would like to ask why it would not be a practical idea to take an old tin pan and an alcohol lamp and put the discharges of the urine and feces in and boil it, in an outbuilding? Why would not that be a thorough disinfection of it, and practical?

Dr. Lewis—This question has been asked — if any gentleman can answer it.

Dr. Doughty—I think we might consider Dr. Curtis our Atlas. He has a lot of questions on his shoulders which he has not answered and which I believe we expect answers to. I would like once more to ask in regard to typhoid bacillus. We have understood, from what the doctor said, that disinfection was not destruction of the typhoid bacillus.

This is the question: In the country, there has been much obloquy heaped upon the privy vault. May we not, since the typhoid bacillus is not destroyed by disinfection (Dr. Curtis says it is not, it still is virulent), if the privy· vault is distant from any source of potable water supply, and it is a good sized vault, and it is likely that its contents will not be disturbed for a number of years, and it is probable that the contents of the vault will not be used for any other purpose — why not, when the typhoid bacillus has been partly disinfected, and is ready for disposal somewhere else, instead of digging a trench four feet deep and covering it up, why not put it into the privy vault and let the typhoid bacillus *requiescat in pace* there.

Dr. Johnson (in the chair)—Dr. Curtis, did you hear the question as presented by the gentleman, relative to the destruction of typhoid bacillus?

Dr. Curtis—No, I did not, doctor; but I think we made a fetish rather of disinfection. That was my thought when speaking before — the ineffectiveness of most of it.

It occurred to me when Dr. Bracken was speaking, that I doubted whether he wanted to recommend to this body the final disposition of typhoid stools by throwing them on the surface, notwithstanding it may be true that the effect of air and sunlight are so effective as germicides. We must consider something more than disinfection. We must remember something about the life history of the typhoid germ outside of the body.

Now, I think there is no place in which they will maintain a longer vitality than they will in the soil — in the arable part of the soil — in that part of the soil to which air in some degree penetrates; and the objection, therefore, seems to me to lie very strongly against putting them where they will be in that environment where they will maintain that vitality.

In that same connection, I would like to ask Dr. Tucker (?) if it would not be wise, if we are going to investigate as to the reasons or experience in control of epidemics, whether it is not pertinent to extend that over a period of years. It is just as important to know whether it may not recur next year, as they are eliminated this year.

Let us put these germs where they will not maintain their vitality and exist from this year to next. I doubt if we have any limit, or know any limit to the prolonged vitality of these typhoid bacilli in the soil; and I have no doubt that our autumnal recurrences of them are largely due to the implantation of the germs this year and their retention of life until the succeeding year, and that our inquiry must extend to cover them.

We know much better how long the typhoid bacillus will exist in water; we know something about how long it will live in perfectly pure water and in sterilized water (that is water which contains organic material, but in which other germs are destroyed) and we also know about how long it will live in the presence of other bacteria. And that brings us to the disposition of it in privy vaults.

I doubt whether germs or bacteria will live long in the presence of such quantities of inimical bacteria as they would meet there, any more than they will live long in a sewer, where they certainly are rapidly destroyed, and their only hope of living is escape into the purer stream.

It seems to me we cannot rely on any methods of disinfection short of absolute destruction; we cannot make sure of their destruction by ordinary germicide treatment. We must take into account the conditions under which we place them, even after we have disinfected, which will be the least likely to promote their life and least likely to afford their escape into running streams or wells.

While I do not know that I am correct in my proposition, it seems to me that it would be much better to dispose of them so far as possible in a deep trench where they are packed down and as thoroughly deprived of the entrance of oxygen as possible to do so. I know that to allow an accumulation of them upon the village premises upon the surface, as I have actually seen them, is exceedingly bad, and even if they are remote and scattered here and there, the possibility of their entry into the surface soil and conditions thereby arising which would favor their protracted life, would be very undesirable.

Prof. Landreth--The remarks of Dr. Curtis and Dr. Bracken on the relative merits of *deep* as compared with *shallow* burying of typhoid dejecta, as a means of disinfection, are very interesting. As an engineer I am unable to contribute anything from the medical side of the discussion, but it may be worth while to call attention to the striking similarity between the conditions in the soil and in a properly designed and properly operated intermittent sewage-filter, so far as relates to the bacterial purification of dead organic matter or even to the disinfection of infectious matter. In each case the purification or reduction of organic matter is accomplished wholly by the agency of numerous species of low organisms, mostly bacteria, some of which already exist in the organic matter, while other species are indigenous to the soil or to the material of the filter. These two groups of species differ generally in their nature and in their functions; the various species brought by the organic matter are, in the main, anerobic and operate in the interior of the organic masses and tend to produce putrefactive liquefaction; this group also contains the pathogenic species, if any, to destroy which is one of the chief purposes of filtration or burial.

The other group which inhabits the upper region of the soil and the upper layers of an aerated filter, are on the contrary anerobic and cannot subsist below the level at which aeration ceases. These species attack the partially decomposed organic matter, taking up the work where the anerobic species left it, and carry the reduction further toward the ultimate chemical elements of which the organic matter was composed, but rarely reaching the ultimate stage of analysis, ending instead in the form of nitrates and nitrites, carbonic dioxide and water, which pass off in the affluent water in solution, or are absorbed as plant food by vegetation.

This latter group of species of soil bacteria also destroy the pathogenic bacilli, either by antagonism or by creating conditions unfavorable for their sustenance. Experience with sand filters used for sewage purification establishes the fact that pathogenic bacilli are reduced by filtration in at least as large a proportion as the other species of bacteria contained in the sewage, and that some species suffer even greater reduction.

Dr. Sidney Martin, in experiments conducted for the Local Government Board of England, extending over several years past, has shown that in cultivated soils, i. e., those containing some organic matter, the typhoid bacillus, if added to the soil, lives for a prolonged period and spreads through the soil, provided the soil be first sterilized, but that the bacillus was destroyed or at least could not be discovered after twelve days if the soil had not first been sterilized.

Dr. A. C. Houston, another English sanitary expert, has also shown, by a different type of experiment, that soil bacteria are more hardy than sewage bacteria, and that in the struggle for existence, the latter give way before the former.

Now, deep soil is generally sterile, certainly it is so at the depth of four feet, the depth at which Dr. Curtis would advise burying typhoid excreta. Similarly, the lower depths of sand filters are known to be of little value of filtration. There would seem, therefore, less reason to expect the destruction of pathogenic species at this depth than in the upper and better aerated and better cultivated layers of the soil where the soil bacteria thrive.

I do not understand Dr. Bracken to advocate actually throwing the excreta on the surface of the ground; that would incur the danger of distributing the infection by surface drainage or other means, which need not occur for shallow covering.

It appears, therefore, desirable that this infectious matter should be buried in cultivated soil, such as garden soil, where it will not be disturbed, and that it be deposited in thin or sparse layers and well covered with cultivated soil, not less than six nor more than twelve inches in thickness, and firmly tamped to insure efficient bacterial action.

It is hardly necessary to say that this matter should not be buried near growing vegetables that are soon to be used, nor in such situations as permit of percolation into wells or cisterns.

Dr. Bullard—While it may not have been literally meant that it was wise to dispose of discharges on the surface of the soil, I think there is one very valuable reason which has not been mentioned why it should not be done, and that is the possibility of the infectious material, providing any has been left, being carried where it will do harm through the agency of flies and insects. You can put it down (it is quite a problem where we should put it), but it seems very evident that we should, above everything else, put it somewhere where the flies won't get at it, and either bury it some distance or put it into the sewer or privy vault, and as suggested, in putting it into a privy vault, the majority of them contain more or less water, and with large quantities of lime put in there, that would be a practical way to do it, and especially inasmuch as your privy vault has undoubtedly more or less of it put in there, and inasmuch as you are not certain of the fact that your privy vault, although it may be apparently far removed from the source of potable water supply, that does not insure that your privy vault does not drain into your water supply, and that some attention might well be paid to such vault.

Dr. Lewis—This morning's session will be closed by listening to a paper from Dr. Bryce.

Dr. Bryce:

Mr. COMMISSIONER AND GENTLEMEN—The only reason, and in fact the only excuse, I can give for taking a paper such as that entitled "The Ethical Value of Education in Preventive Medicine," is that, when I was first invited by your good Commissioner to come over, I was not sure whether I could come until a few days ago, and second, that we have had so much of the every-day, practical work of health officers since we began, that I think we may be excused for looking at just another phase of Preventive Medicine—that is, the ethical value or effect upon our social customs and methods of life of Preventivè Medicine; and with that idea, Mr. Chairman, I will read the following:

THE ETHICAL VALUE OF EDUCATION IN PREVENTIVE MEDICINE

Mr. PRESIDENT, LADIES AND GENTLEMEN—I have thought it worth while to attempt to present a phase of preventive medicine which, though playing an important part in our social welfare, is often not consciously realized by us. We are so occupied with the practical concerns of our intense every-day life, and so often fail to recognize those influences which direct and govern our acts, that in a certain sense we are automata, dependent upon our sensations and impulses.

Now, none who recognizes and realizes man as a highly organized member of the animal kingdom can fail to see that, as Carlyle remarks of the peptic countryman who did not know he had a stomach, the very perfection of health is that where the several elements of life are so harmoniously adjusted that, like a perfect machine, "life, from its mysterious fountain flows out as in celestial music from the diapason, while it is only discord that loudly proclaims itself." Hence it is apparent that, if man were but the perfect animal his life in harmony with its environment, would begin, develop, and perform its destined purpose and functions, and as gradually and quietly proceed to its euthanasia. But he who gives even the most superficial thought to the problem of life, and especially to that of modern civilized life, must recognize that the very conditions of human progress which have made society so complex, indeed so artificial, compared to that of man in a primitive state, have created problems that demand their solution, whether we attempt them or not; and it will be he who, realizing this, and heroically taking up the task, that will personally reap the most precious fruits of his human existence and carry out most perfectly the purposes of the Creator in His universe. It must have often occurred to many that the old proverbs and sayings, which have become a part of our daily language must have had their beginning in the minds of thinkers at one time or another, and had been accepted either because of the manifest truth in them, or because they had been associated with the name of some great personage, whom we have been taught to think of as very wise or divinely inspired. Doubtless both reasons are correct; but we have, I doubt not, been accustomed to accept many such as true, which, if analyzed and examined in the light of modern knowledge, are in fact the opposite of truth. We say, "the sun goes down," but as a fact it is the earth which, in performing its daily revolution, produces the phenomenon. We say, "I have caught cold," when as a matter of fact the result is due to the too rapid or unequal loss of body heat. So it is apparent that, dependent upon our knowledge of physical causes, we form our conclusions as to the nature of the phenomena which we observe whether in the natural world about us or in the mental or spiritual world within us. In nothing, however, are we so constantly engaged in drawing inferences as in the relation which our health holds to our environment; and in no field of human thought has the scientific progress of the last century produced more profound impressions than that of medicine. Amongst all early peoples and amongst many semi-civilized peoples to-day sickness was associated with demoniac influences, and Christian peoples were long accustomed to associate plagues and outbreaks of disease with the anger of an offended deity. Without dilating upon this fact, it need only to be pointed out that, with the constantly increasing extent of our knowledge of the physical laws, the realm of the supernatural has become more limited, and we are now beginning to closely inquire, whenever disease appears in any community, not what deity is offended, but whence did the case arise? Now if I am right in this, and I am certain of it, you will agree with me that our changed mental attitude is due to some cause, and it is quite evident that it is the result of education in what we call preventive medicine. I think I am not wrong in saying that the old idea of medicine that was presented to most of us was that of a person becoming ill and that something placed in a bottle, an infusion from some one or several herbs, and called medicine, or the healing potion, was absolutely necessary, if recovery was to be expected. Now, as a matter of fact, the old Greek, who gave us the first comprehensive idea of medicine, and raised Aesculapius, the Father of Medicine, to the rank of divinity, had a much wider and wiser conception of its meaning than many have to-day. His very name meaning blameless physician, recalls the legend of how, under his master, Chiton, he became so skilled in healing that Jupiter became jealous lest through him men might escape death altogether, and, to please Pluto, killed Aesculapius with a thunderbolt. He left Epigone (soothing), his wife and his children—Alexander (aider of men), Aratus (the prayed for), Hygiena (soundness of body), Jaso (a remedy), and Panacea (a healing herb), and as appears from these names in their order, those children concerned with the healing art, Jaso and Panacea were placed last. Without, however, pushing this illustration further, it is apparent that to those open-eyed Greeks the preventive side of medicine stood in highest honor, and to-day we are similarly realizing the superior value of this side of the science. It is somewhat remarkable that the practical application of preventive measures in medicine were so long overlooked. The mariner knew that a leak in his boat must promptly be stopped, otherwise it would soon swamp and so he stopped it; the engineer knew that one slight breach in the embankment, if not remedied, meant an inundation, and so repaired it; while the threatening conflagration is prevented when but a small fire, but for the reason already referred to, physical sickness was carried into the moral *sphere* and was dealt with along other than physical lines. Public prayers were called for, and general humiliation during the outbreak of cholera and small-pox even in Canada within the past fifty years; while people continued to drink polluted water and refused vaccination.

It seems quite evident, therefore, that the subject of our paper is not an inappropriate one for us to discuss and to endeavor to comprehend in its bearing, not only upon personal well-being, but upon good citizenship. If we analyze the reasons for material and industrial progress of one of Ontario's cities, if we ask why the Province of Ontario has become the garden of the Dominion, and a hive of manufacturing industry, we all are quite ready to answer, "Because the intelligent energy of our people has taken advantage of physical conditions, as of soil and climate, and water-power, and wind-power, and, by utilizing natural forces, has produced an abundance of raw materials and has converted them into the manufactured article. Such has supplied in over one hundred cities, towns, and villages, public waters for common convenience and economy, and for preventing losses by fire. In every one of these particulars we have the measure of an elevation in the social scale through the intellectual advancement of the people. Natural causes produce their natural inevitable effects, and material comfort, social happiness, and individual well-being are all advanced in a most logical and natural manner. If I am right in carrying this line of thought into the sphere of medicine, and the mortality statistics of the Province support the argument, when it would seem apparent, in proportion as we understand the causes productive of disease, that invariably such are directly or indirectly ascribable to some physical reason, and we shall be able equally to promote social well-being, and individual health and happiness, as we take advantage of the teachings of Preventive Medicine for the prevention or suppression of physical disease. It is a remarkable fact, with the many examples coming down to us through the centuries with regard to physical education, so important an element in preventive medicine, that we have lost or never taken advantage of some of the first principles taught us by the peoples of the older civilizations. For instance, Plutarch, in his life of the Spartan Law-giver, tells us that Lycurgus began the education of youth at the very source. Not only were marriages regulated, but he ordered maidens to exercise themselves in running, wrestling, and throwing quoits, that they might be more vigorous as mothers. I am not aware that the nursing bottle was a part then of the nursery furniture. When a woman of another country said to Gorgo, the wife of Leonidas, " You of Lacedaemon are the only women in the world that rule the men," she replied, " We are the only women that bring forth men." But need we more than glance at the delicate mothers and their weakling infants struggling into childhood on artificial foods, in order to comprehend that in a country in which forty years ago had only seventeen per cent. of its population living in cities, and now has forty-five, the very lack of knowledge or practice of the principles of Preventive Medicine has produced and is producing a race which, in many respects, bears the marks of degenerating influences, which must be reckoned with if we are to maintain that physical pre-eminence inherited from our British forefathers.

Observe it at another stage, that of childhood. Amongst the most delicate, indications of robust health is the state of children's teeth and statistics have been given us by physicians and dentists in Canada and the United States showing that in a very large proportion of school children, decay of the teeth has taken place, due to innutrition which is intimately associated with another defect, that of abnormal vision. The causes are patent to all of us. Instead of the plain foods, as whole wheat bread, or even oat or rye bread, the soft starchy foods and sugars are increasingly being used; fats are used decreasingly, resulting in bone and muscle being notably deficient.

It is the palate that is tickled, and the innocent child suffers accordingly. But the evil does not stop at this stage. Our social customs seem specially formed to complete the evils already deaccentuated. I have taken the trouble to tabulate the deaths by age in some of our counties, and find that from fifteen onward, the age at which that ever present result of innutrition, consumption, begins to make itself evident, the deaths amongst females was, in a five-year period, as two to one in males, the latter fortunately, owing to outdoor life, more largely escaping the danger. When it is understood that for a single county taking a five-year period, the total deaths in females between 10 and 20 was 100 to 54 in men, and that it was one-seventh of the whole, we can appreciate the truth of the remark of Sir Frederick Treves, the great surgeon of England, who says: "The physical condition of a large portion of the girls and women in this country (England) is quite deplorable especially among the middle and upper classes. The girl spends hours in an ill-ventilated school-room and upon a piano stool, and the rest of her time is occupied in eating and sleeping, in preparing lessons, in stooping over needlework, and in taking formal walks with the governess. Her clothes are probably a collection of hygienic errors."

"A good digestion and an active liver are more useful in the battle of life than a knowledge of advanced mathematics, and sturdy limbs and strong hands are of more value to the mother of children than even decimal fractions and a familiarity with irregular verbs."

With such words from so great an authority, following the statistics I have given, it will not be difficult to appreciate the ethical value of education in preventive medicine. It is quite evident that it involves education against doing those things we ought not to do, and leaving undone those things we should perform. What is further most apparent is that this education has the highest ethical or moral value since the mother who understands the laws of hygiene and practices them will not fail to exert her authority in enforcing them by example and precept upon her children. I have but recently returned from spending a few weeks among the dwellers of our summer resorts, and have observed how closely cause and effect are related. You go to a summer hotel, and the usual sight is to observe children and most young ladies dressed in the height of fashion, taking every opportunity to buy sweetmeats from the sully boats, while in the evening for the older ones dancing is often kept up until a late hour, but little real outdoor exercise being taken. On the other hand, one visits a summer cot-

e sees barefooted children dressed in a sweater or an old
offending against all social proprieties by running about
vages — swimming, paddling, rowing — while ravenously
ing at meal-time the plainer foods which are most readily
able in such camps. The life in the one case has been
a dissipation of energy, and in the other a storing up of
e of bone and sinew for the work or studies of coming
.

milar comparison may be made regarding the modes of
ng their holidays by persons of mature years. Many will
ly engage in some physical occupation to assist in the
ation of the wastes of the body, while at the same time
ting reconstruction of tissue. Many years ago, Dr. Lauder
on, a leading physician of England, pointed out that for
s engaged in intellectual pursuits, a summer holiday of
eeks is demanded, during which absolute freedom from
ng except agreeable outdoor exercise is required, in
that the nerve tissue — that which, while most resisting,
s the longest rest — may, by new tissue, have its energy
d.

y will have read with amusement the newspaper reports of
ny notables recently present in London at the Coronation.
ly, however, the most interesting was Ras Mackonnen, the
nian Prime Minister. While amused, edified and in-
d, he has also been an acute observer. A Mohammedan,
yed with all his suite the injunctions of his religion, and
ned wholly from alcohol and tobacco. He marveled at the
a policeman, saying, "All is so orderly, all is system."
also noted, watching the London crowds, "I see that every-
urries." And if one were to crystallize our social business
y shortcomings into a single phrase, it would be that of
ual rush and hurry which marks increasingly our people
here. The countryman notices it in the town, the towns-
es it in the city; we in the cities are beginning to see it
es. I have recently had several conversations with a
ork friend engaged in large business transactions, who has
o Canada and bought a small farm to retire to soon, he

says. He is not yet fifty, but says that that is an old age for a modern New York man to be able to do hard work at. He has mentioned one after another of his many friends of the stock market and amongst the merchants, who, strong and vigorous, have in a few short years died exhausted from brain disease, heart or kidney disease—those organs most affected by the stress and tension of high pressure life. Some of us have marked and noted, even amongst our own friends, the number of comparatively young men who have died from these diseases, essentially old age maladies.

I have used the word ethical, and have taken it in its usual secondary meaning, as pertaining to the habits and manners of the individual or community, and have desired to point out conditions with regard to the purely physical aspects of education in preventive medicine. But there is another result, belonging to that distinctive side of morals, which we commonly define as character, which after all, as moral beings, we must always deem of first importance. The sages of every country, whether in ancient or modern times, were those whom Carlyle calls the seers or poets of their age; and, properly so, for their distinguishing characteristic has ever been to search into the heart of things, and ask not only What am I? but also, Who am I? and Whence? That Hebrew classic, of inestimable value, will never be placed first, for the prominent place it has ever put man in in relation to the Divinity as regards his duty; but the literature of every classic country has handed down to us the words of wisdom of the world's greatest thinkers. All will remember the problem presented in a marvelous drama of Job, revolving around the oft-asked question, "Do good men suffer, and why?" which was answered with a "no" by his Pharisaic friends, with the inference that Job's sufferings were punitive, just as the Greek poet, Aeschylus concludes, using the words, "Whatsoever evil men do, not less shall they suffer," while he further repeats, almost in the words of the Decalogue, that the punishment may extend to even the third generation.

But we turn from these stern teachers of an earlier time to those breathing a more generous spirit, and as in the beautiful

Greek story of the self-sacrifice of Alcestis dying for her lord Admetus, and in the yet infinitely grander story of the gospels of that Christ who died for a whole world, see in these illustrations of another phase of morals, which our subject necessarily forces upon us.

In these days when, as in our wide country, possibilities of material success are ever opening up to every young Canadian, where ambition finds almost no trammels in the attainment of its deals, we cannot but recall the last words of Tennyson's "King Arthur"—

> "For what are men better than sheep or goats
> That nourish a blind life within the brain,
> If, knowing God, they lift not hands of prayer
> Both for themselves and those who call them friends?
> For so the whole round earth is every way
> Bound by gold chains about the feet of God"—

and endeavor to make ourselves realize in some slight measure something of the pregnant meaning such words contain. The important matter, if we consider the question at all, is: What would seem to be the end and purpose of being, as regards either ourselves, the society or country in which we live, or towards a universe in which, however infinitesimal units we may be, we nevertheless form an integral part, without which the infinite whole would be incomplete. Gazing backwards, and endeavoring to imagine the beginnings of our world, so minute a fragment of the universe, arising as it did out of chaos, I think of its crude, uninhabited crust, and of the development of that infinite purpose of its Creator, since life upon it began. I read the story of its rocks, and sea evolution from the simplest formless protoplasm to beings having an organized life, upwards through the numberless years of its geological aeons, and find in all and everything that—

> "Our little systems have their day;
> They have their day and cease to be"—

with cosmic change and cataclysm burying all; but in all and throughout all I observe a movement upward, an orderly progress toward a world-period, when man appears. Seemingly, as they gaze back upon him—crude, uncouth, untaught, primitive, but as complete in his place and time, as complete in harmony with his environment, whether it be in the caves of Dordogne with his associates, the bear and reindeer of the great Ice Age, or in those long uncounted subsequent years, when the man, God-like, with imperial front raised to the stars, told his love to the women in Eden where the Accad race placed the paradisaic abode of Adam, their patronymic founder and prototype, and raised it later towers to heaven. Now, within the period when this conquering last-created race of men could not only acclaim its godlikeness, but could further transcribe its glorious achievements upon moulded tablets, we can still see material progress followed by moral declension, till a climax is reached, and a civilization effete, yet having accomplished its purpose, is buried under Syrian sands, remaining as a monument of something accomplished, and a lesson, to those who will read, of something passed, but which teaches not more the vanity of human things than of an

"Eternal process moving on."

Within the few short century days since then, individuals and races have come, shone like falling stars for the moment, and gone; yet never failing to transmit to the generations following something of those forces with which they were endowed, whether physical or moral.

If, in our place in this ever-ending but never-ceasing stream of influence, we can even in a slight degree comprehend that all our individual and combined social, national and world-wide energies, with those yet to be of our century, are but one of the hours in the cycle of cosmic time, we must at least faintly realize that it is not ours alone to enjoy the gilded hours, but that we must also play a part in this drama of evolution; and that every physical, mental, and spiritual force with which we are supplied is dedicated to the work of a movement upward, whose end is the approximation of those primal atoms which, first endowed with simple yet all-sufficient physical powers, have had added through aeon, age, cycle and century some finer, higher manifestation of force, to those qualities, which, undiscoverable, unreal, as yet to us, are nevertheless to become cognizable and attainable, when the material, complete, adjusted to its infinite environment, shall no longer seem base or evil, unfitting or foreign, but shall prove to be but one with the spiritual from which it emanated, and with which it will find itself ultimately in complete harmony. Thus does Tennyson apostrophize his departed friend, Hallam:

> " Since we deserve the name of friends
> And thine effect so lives in me,
> A part of mine may live in thee
> And move thee on to noble ends."
> " In Memoriam."

Looking upon life from this standpoint, it is apparent that we must see in preventive medicine a science which, before all and every other, endeavors to illustrate the wisdom contained in that old-time riddle of the Sphinx, "Know thyself," and which Perseus, the hero of the light, succeeded in interpreting, amongst his many other labors, for the good of mankind.

This is essentially an Herculean task, and one which brings happiness, honor, and glory, to him who, like that mythical hero, slays the Medusa for the good of men.

I cannot in concluding do more than urge that the book of sanitary wisdom, which to-day is so wide open that he that runneth may read, be sought for by all; that in it we find, learn and follow the words of wisdom, which teach us not more our duty to ourselves than our duty to others, and that in doing both we will best fulfil the purposes tending to that universal good to which all created things move.

Dr. Lewis—I wish some member of the conference would make a motion conveying to Dr. Bryce the thanks of the conference for his address and for the interest which he has taken in the proceedings and the contributions which he has made to our proceedings.

Mr. Doughty—I would like to make such motion.

(Motion seconded and unanimously adopted.)

Dr. Bryce—It is with pleasure that I accept the vote of thanks, and I have enjoyed and profited very greatly by the splendid meeting here of the health officers of the state. Indeed, I have never seen so large an attendance of any conference of sanitary officers anywhere. I am quite certain that the amount of good coming from it can scarcely be estimated.

Dr. Lewis—This afternoon there will be four papers for discussion—Dr. Curtis on vaccination, Dr. Guilfoy on vital statistics, in which many of you will have an interest, and which will perhaps elicit considerable discussion; Professor Landreth and Dr. Baldwin. They are all papers of exceeding interest, and we will convene at 2.30 in order to have ample time to complete the program. We will begin promptly at 2.30 this afternoon.

Adjourned until 2.30 p. m.

2.30 P. M., *October* 31, 1902.

Dr. Lewis—Dr. Pease, the director of the antitoxin laboratory, wishes to make a statement.

Dr. Pease—Many of the members of the conference have not as yet found out that we are supplying antitoxin, to be used in charitable cases, free of cost, and every health officer in the state is urged to keep on hand a supply sufficient for the uses that he thinks will be necessary.

We have quite a lot of antitoxin in the capitol, and if any health officer desires it, he can sign the usual blank, which he will find out on the registration table, receive the amount that he asks for and take it with him. The use of it will be explained out at the table, if anyone desires to obtain it.

Mr. Stuart asks me to state that, instead of taking it with you, he will send it to you to-morrow, inasmuch as the clerks are all busy with the conference work, and will not have time to put up the samples in the wooden boxes; but if you will fill out the blank, we will see that it is sent to you to-morrow.

Dr. Lewis—I would like to call your attention to the plans for the hospital for contagious diseases, which is posted up in the rear of this room. I expected the architect here to explain the plans, but he has not been able to do so.

They were drawn at our request, in order that we might reply to the inquiry as to what kind of hospitals the different towns and villages should build. The plans are so drawn that it can be a one, two or three story building, according to the number of cases required to be taken care of. I found it a very interesting plan, and I think, if we do not have an architect here to explain it, that it explains itself very well. It is a blue print, tacked up in the rear of the room.

I might mention here that we expect you all to attend an informal reception at the Bender Laboratory this evening, from eight to ten o'clock.

I think, if Professor Landreth is ready, we will listen to Professor Landreth's paper first—on the Present Status of the Laws and Decisions for the Protection of the Purity of Streams. Professor Landreth is Professor of Engineering in Union College, as well as Consulting Engineer of this Department.

THE PRESENT STATUS OF STATE LEGISLATION AND COURT DECISIONS BEARING ON THE PROTECTION OF WATER COURSES FROM POLLUTION

BY OLIN H. LANDRETH; PROFESSOR OF ENGINEERING, UNION COLLEGE; CONSULTING ENGINEER STATE DEPARTMENT OF HEALTH

MR. COMMISSIONER AND GENTLEMEN OF THE CONVENTION—I propose to discuss at this important conference the question of the present status of sanitary laws and regulations, only in so far as they protect the purity of the waters of the state. You will appreciate, I think, that inasmuch as this is presented by an engineer and not a lawyer (the subject being a legal one), that no such degree of authoritative statements can be made as characterized the very valuable paper by Judge Warner yesterday. I shall, therefore, confine myself strictly to a statement of the facts as I understand them, and make some citations.

During the past ten or fifteen years a very decided advance has been made in the status of legislation, and of the court decisions bearing on the purity of waters and the protection of their purity.

I shall touch the subject under—first, general laws and decisions; and second, New York laws and decisions.

STATUTORY LAWS

It may be profitable to refer here to some of the more recent and important laws of our neighboring states, bearing on the prevention of water pollution, giving the date of each law, and a brief summary of its scope.

Massachusetts

Massachusetts legislation on the protection of waters is probably the most advanced of any of the states of which I have knowledge; and its sanitary laws, so far as they effectively protect water supplies, date from 1888, at which time the State Board of Health was given partial supervision over the waters of the state (laws of 1888, chap. 375). The powers were greatly extended in 1890 (chap. 441), and have been subsequently added to, so that at the present time the State Board of Health is practically in control of all the waters of the state, whether they are used for drinking purposes or not (laws of 1896, chap. 252; and laws of 1897, chap. 510), and has jurisdiction to hear complaints and defenses and to adjudicate in the matter, and to recommend at least the changes which must be brought about to make the conditions desirable.

Connecticut

The next state I mention is Connecticut, which has moved very decidedly in the last few years, commencing its activity in 1888, when it passed a general act (Gen. Stat. 1888, sec. 2585), giving the State Board of Health the right to investigate the subject of the purity of waters, and to suggest remedies. The pollution of ice supplies is prohibited in section 2651. The placing of dead animals in streams is prohibited in section 2652, and penalties for injury to drinking water supplies are provided in section 2653.

In 1893 Connecticut appropriated money for meeting the expenses of the State Board of Health for that purpose, and has since done so, and more recently the legislature has established a state sewerage commission, whose purpose, of course, is to improve the quality of the waters of the state.

The commission has just issued its third annual report, and has been making progress in the work of gathering statistics and information, looking chiefly to the solution of sewage disposal problems.

New Jersey

The state of New Jersey has taken very active steps during recent years toward the improvement and protection of the purity of its waters.

In 1893 (laws of 1893, chap. 157) a law was passed providing a penalty for the pollution of any creek, brook or pond running through or along the border of any municipality.

This protection was further extended in 1895 (Gen. stat. 1895, p. 1107) by providing a penalty for burying dead animals or other offensive matter within 200 feet of any stream running through or along the border of any municipality and for befouling such streams in any manner.

The same law (p. 1108) prohibits the depositing of earth, ashes, etc., on the shore of the Hudson river and (p. 1109) a penalty is provided for polluting in any manner water from which ice is taken.

Sewers enclosed in streams are not permitted to empty into tide water basins established by or under authority of the state (Gen. stat. 1895, p. 634).

By an act of 1896 (chap. 7) the governor was authorized to appoint a commission to consider and report to the legislature on a general system of sewage disposal for the valley of the Passaic river for the purpose of stopping the pollution of that stream, and an appropriation of $10,000 was made to cover the expenses of the investigation.

Following this (laws of 1897, chap. 35) a law was passed prohibiting the pollution of the Passaic river and its tributaries above the Great Falls of the Passaic at Paterson. This was intended to secure the protection of the extensive water supplies for numerous municipalities taken from the river at this point.

Following the idea of the Passaic commission of 1896, a state sewer commission was appointed in 1898 (chap. 136) to consider the subject of the pollution of rivers and streams of the state, to provide a plan for the prevention thereof and for the relief of persons and property affected thereby and to provide for the expenses of the investigation.

The discharge of polluting matter into the waters of any stream or reservoir from which any city or town obtains its water supply was prohibited by chapter 41 of the laws of 1899.

In the same year (chap. 210) a permanent state sewerage commission was created to make investigations, establish sewerage districts and prevent the pollution of streams.

This law was amended and the scope of the commission extended by chapter 72 of the laws of 1900.

Chapter 116 of the laws of 1899 gave the State Board of Health the power to prevent the contamination of public water supplies for cities of one million inhabitants.

Chapter 49 of the laws of 1902 provides that the legislature may create and incorporate sewerage and drainage districts and that the governor may appoint district commissioners for such districts.

Chapter 48 of the laws of 1902 establishes the Passaic valley sewerage district. The commission appointed under this act is about to recommend the construction of a large trunk sewer extending from Paterson to New York bay for the purpose of relieving the pollution of the Passaic river and its tributaries by providing an outlet for the sewage for the cities and villages lying in the Passaic valley.*

Pennsylvania

The laws of 1895 (chap. 131) make it a misdemeanor to trespass on certain lands of a water company and pollute the waters of the same, and this law also provides that any watchman of a water company or any constable or policeman may make without warrant arrests for violation of this law.

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*Since the reading of this paper this recommendation has been made and the legislature of 1903 has authorised the Passaic valley sewerage commission to proceed with the construction of the sewer at a cost estimated to be about $7,000,000. New York authorities fearing that this discharge of sewage into New York bay would produce unsanitary conditions in the bay and adjacent waters, a bill was passed by the New York legislature of 1903 authorising the appointment by the governor of a state commission to investigate the probable effect in New York bay of the proposed New Jersey sewer. This commission is now engaged in the investigation in question.

Chapter 151 of the laws of 1895 makes it unlawful to open new burial places within one mile of a site of land draining into a source of water supply.

Ohio

By a law passed March 14, 1893, the approval of the State Board of Health is necessary before any city, village or corporation may install a public water supply or sewerage system.

The laws of 1897, sections 6921, 6923, 6925 and 6927, prohibit the befouling of any lake, river, stream or pond by coal, petroleum, refuse, dead animals or other waste matter.

By a law passed April 25, 1898, the State Board of Health is required to examine and report annually on the condition of all public water supplies, and such examination has been extensively undertaken by the board for all the principal sources of supply in the state.

States in General

A year ago I mentioned in my talk on the subject of sewage disposal a paper† which was then to appear before the American Public Health Association by Dr. John L. Leal, health officer of Newark, N. J., who digested the laws of the several states relating to water protection and cited decisions of the courts. His paper has been published since that time, and it is therefore permissible to make extracts from it. His paper covers so thoroughly some of the phases of this question that I shall quote from the paper.

Dr. Leal classifies all state laws for the protection of water under five different groups.

The first group comprises those states which have the mere rudimentary laws, which merely provide for the prevention of the poisoning of wells, springs and reservoirs. In that group he found, a year ago, the states of Georgia and Rhode Island.

In the second class he places those states and territories the laws of which seek to prevent the pollution of water by means of certain specific agencies — not against general pollution, but against specific kinds, naming the kinds — and in that class he places the states of Vermont, Wisconsin, California, Idaho, Oklahoma and Indiana.

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†The Legal Aspects of Stream Pollution. By John L. Leal, M. D. Annual Report American Public Health Association, 1901.

In the third class, to which belongs the states and territories the chief aim of which is legislation which seeks the protection of a certain water supply or supplies — this protection being extended to only the water supply of a city or cities, and arising from superior intelligence or a demand for greater purity on the part of those protected than for the state at large. To that class he assigns the state of Michigan and the District of Columbia.

In the fourth class (a more general class, and more valuable in its results) he assigns the states and territories whose statute laws forbid the pollution of waters used for public supply. It represents an advance in intelligence over the preceding one in that it shows the people of a whole state able to appreciate what only the people of a town could appreciate in the other class. The various laws differ widely in the different states, but their pervading spirit is the protection of water used for potable purposes. Many of these laws show plainly the changes in scientific opinion within comparatively few years. Some of the first of them forbid pollution of potable waters, but make an exception in the case of the discharge into them of the sewage of cities and towns and the waste matters of certain industries. Then, a little later, will appear in the same or some other state, forbidding such discharge within three or more miles of the intake of a water supply. Then finally is evolved the law forbidding all pollution of all water used for potable purposes.

To this important class of states he assigns Maine, Kansas, Delaware, Montana, Minnesota, Alabama, New York, Connecticut, Arizona, Virginia, Florida, Wyoming, New Hampshire, Alaska, Oregon, Mississippi and Pennsylvania.

Dr. Leal characterizes the states having the best laws in this group as Connecticut, Minnesota, New York, Maine and Virginia.

To the fifth class, the last and best of all, he assigns those states having laws which seek to protect all waters within their boundaries, whether used for potable supplies or not. To that class he assigns Missouri, Tennessee, North Dakota, Nebraska, Kentucky, West Virginia, Utah, Nevada, Massachusetts, Iowa, Illinois, Colorado, New Mexico, Washington, Maryland, North Carolina, Ohio, South Dakota and New Jersey;* and in that list, those possessing the most advanced legislation he considers to be Massachusetts, North Carolina, Utah and New Jersey.

You will understand that this classification of the laws does not go to the enforcement of their successful utilization, but simply to their wording on the statute books. A good law may be of no earthly account if advantage is not taken of it, and a poor law vigorously enforced may be of some use.

I shall consider New York laws more particularly later.

COURT DECISIONS

In the matter of court decisions, I submit a list of decisions of comparatively recent date. These are mainly on actions brought under the common law, but cover many of the states of the Union, and while they are different in circumstances and details, they are monotonous in the general character of their decisions, all practically recognizing the existence of a superior right in the element of *quality* of water, and making the right to pollute a stream subject and subordinate to all other rights in the stream, and in only one case giving a decision adverse to that principle, except on some particular or special characteristic, or else on some technicality on which the plaintiff did not succeed in establishing his proof of pollution or of injury. For a portion of this list I am indebted to Theodore F. Hamilton, Esq., attorney of the Saratoga and New York bar.

Court Decisions in Stream Pollution Cases

Hill v. Smith, 32 Cal., 166.

Carhart v. Auburn Gas Light Co., 22 Barb., 297.

State v. Wheeler, 44 N. J. L., 88.

Satterfield v. Rowan (Ga.), 9 S. E., 677.

Collins v. Chartries Val. Gas Co. (Pa.), 18 A., 1012; 131 Pa. St., 143.

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*By a law passed since Dr. Leal made this classification and in fact since this paper was read (N. Y. Laws of 1903, Chap. 436) the state of New York has acquired a right to be classed in this fifth group and apparently at the head of the group.

Brainerd v. City of Newton (Mass.), 27 N. E., 995.

Price v. Lawson (Md.), 22 A., 206.

Martin v. Gleason, 29 N. E., 664; 139 Mass., 183.

Barnard v. Shirley (Ind. Supp.), 34 N. E., 600.

Townsend v. Bell, 24 N. Y. Sup., 193.

Indianapolis Water Co. v. Am. Straw Board Co. (C. C.), 53 F., 970.

Indianapolis Water Co. v. Am. Straw Board Co. (C. C.), 57 F., 1000.

Young v. Bankier Dist. Co. (1893), App. Cas., 691.

Village of Dwight v. Hayes (111 Sup.), 37 N. E., 216.

Good v. City of Altoona (Pa. Sup.), 29 A., 741.

Joplin Consolidated Min. Co. v. City of Joplin (Mo. Sup.), 273 S. W., 406.

Smith v. Crawford (Sup.), 32 N. Y. S., 375; 84 Hun, 318.

People v. Elk Riv. Mill & Lumber Co. (Cal.), 40 Pa., 486.

Getting v. Union Imp. Co. (Pa. Com. Pl.), 7 Kulp, 493; id., 1 Lack. Leg. N., 51.

People v. Elk River Mill & Lumber Co. (Cal.), 40 P., 531.

Barrett v. Mt. Greenwood Cemetery Ass'n, 42 N. E., 891; 159 Ill., 385—reversing 57 Ill. App., 401.

Karick v. Smith (Com. P.), 17 Pa. Co. Ct. R., 627.

Middlestadt v. Wanpaca Starch & Potato Co. (Wis.), 66 N. W., 713.

Beach v. Sterling Iron and Zinc Co. (N. J. Ch.), 33 A., 286.

Hindson v. Markle (Pa. Sup.), 33 A., 74, 171; Pa. St., 138; 37 W. N. C., 162.

Robb v. Village of La Grange, 42 N. E., 77; 158 Ill., 21.

Commonwealth v. Russell (Pa. Sup.), 33 A., 709; 172 Pa. St., 506; 37 W. N. C., 404.

Jessup & Moore Paper Co. v. Ford, 33 A., 618—6 Del. Ch., 52.

Glassel v. Verdugo, 41 P., 403—108 Cal., 503.

Threatt v. Brewer Min. Co. (S. C.), 26 C. E., 970.

Montana Co. v. Gehring (C. C. A.), 75 F., 384—21 C. C. A., 414.

Morgan v. City of Danbury, 35 A., 499; 67 Conn., 484.

People v. City of San Louis Obispo (Cal.), 48 P., 723—116 Cal., 617.

People v. McCune (Utah), 46 P., 658; 35 L. R. A., 396.

City of Richmond v. Test, 48 N. E., 610; Ind. App., 482.

Barnard v. Shirley, 47 N. E., 671.

Nolan v. City of New Britain, 38 A., 703; 69 Conn., 668.

Paterson v. City of Santa Rosa, 51 P., 557—119 Cal., 387.

Falconer v. City of Jamestown, N. Y. Sup. Ct., 1896.

Schriver v. City of Johnstown, N. Y. Sup. Ct. and Ct. App., 1896.

Squires v. City of Newark, N. J., N. J. Chan. Ct., 1899.

Simmons v. City of Paterson, N. J., N. J. Chan. Ct., 1899.

Sammons v. City of Gloversville, N. Y. Sup. Ct., 1901.

Baker v. West, N. Y. App. Div., 1901.

Morris v. Village of Saratoga Springs, N. Y. Sup. Ct., 1901.

The following cases are taken from a list given by Dr. Leal in his paper above referred to:

Fisk v. City of Hartford, Sup. Ct. of Errors of Conn., July 13, 1897.

Platt v. City of Waterbury, Sup. Ct. of Errors of Conn., Jan. 4, 1900.

Cleveland v. Beaumont (Ohio), 4 Bull, 345; Clev. Rep., 172.

Inman v. Tripp, 11 R. I., 520.

Morse v. City of Worcester, 139 Mass., 389.

Rivas v. City of Antonio (Texas), S. W. R., 885.

City of Valparaiso v. Moffit, Appellate Ct. of Ind., No. 1, 537.

Muncie Pulp Co. v. Martin, Appellate Ct. of Ind. (No. 2, 957. Filed Dec. 21, 1899.)

City of Richmond v. Test, Appellate Ct. of Ind. (2,271. Filed Nov. 24, 1897.)

Peck v. City of Michigan City, Sup. Ct. of Ind. (Mo. 18, 186. Filed March 9, 1898.)

N. Y. Cen. R. R. Co. v. City of Rochester, 127 N. Y., 591.

Seitfort v. City of Brooklyn, 101 N. Y., 136.

Mann v. Willey. (N. Y. Sup. Ct., Appellate Div., Third Dept., May 2, 1900.)

Commonwealth v. Yost. (Sup. Ct. of Penn., July 11, 1900.)

Winchell v. City of Waukesha, Wis., 85 N. W. R., 668.

Green v. Nunnemacher, 36 Wis., 50.

Woodyear v. Schaefer. (Maryland Ct. of App., April Term, 1881.)

Furgeson v. Fermenich Co., 77 Iowa, 576.

State of Iowa v. Smith, 82 Iowa, 423.

Trust Co. v. Prison Com. of Georgia, 92 Fed. Rep., 801.

Herr v. Asylum, Kentucky, 30 S. W., 971.

Kinnaird v. Oil Co., Kentucky, 12 S. W., 938.

Dwight v. Hayes (Illinois Sup.), 42 N. E., 218.

Grey, Attorney-General, et al., v. City of Paterson. (N. J. Equity Rep., 58-1.)

Grey, Attorney-General, et al., v. City of Paterson, N. J. (45 Atl. Rep., 995.)

Many of these decisions contain matter of great interest to sanitarians concerned with the prevention of stream pollution, and a number of them are of peculiar interest to residents of New York state. The space at hand does not admit of a discussion of these cases individually, but the leading principles ennunciated in these decisions have been abstracted by Dr. Leal, and I cannot do better than quote this abstract of principles from his paper, as follows:

"1 A municipality may not empty its sewers upon private property without acquiring the right so to do. (New York Central R. R. v. City of Rochester, 127 N. Y., 591.)

"2 A municipal corporation has no right in the exercise of its power to determine when, where, and how to make improvements, to do so upon a plan which substantially involves the appropriation by it of the property of a citizen to a public use, without making compensation therefor. (101 N. Y., 136.)

"Where the act is of such nature as to constitute a positive invasion of the individual rights guaranteed by the constitution, legislative sanction is insufficient as a protection. (101 N. Y., 136.)

"3 A riparian owner has a right to the water in its natural purity, irrespective of the question of user. (Mann v. Willey, May 2, 1900, N. Y.)

"4 Where a city uses a stream as an open sewer, it cannot acquire by proscription a right to neglect its duty to keep open the channel and to remove the accumulation of refuse therein, and herefore we apprehend that the same principle would apply to he injury inflicted by allowing offensive and injurious odors nd smells to issue from the polluting substances discharged nto the stream from the city sewers. (Owen v. Lancaster, Penn., 897.)

“ 5 If water coming to plaintiff's premises is impaired in value or the ordinary uses of life, or for special lawful uses by reason f any foreign substance imparted thereto by another from rtificial causes, there is a nuisance, and when said nuisance is nce established, the right of recovery cannot be defeated otherise than by the establishing of a right by grant, or proscription, r by express license from the plaintiff. The usefulness of the orks, their absolute necessity, nor the fact that they cannot e carried on without producing the result in question, nor the ct that the highest degree of care and skill is exercised to revent injury, will be no excuse. (Muncie Pulp Co. v. Martin, ndiana, No. 2—957.)

“6 When, if ever, the legislature shall enact that streams enerally, or any streams, shall be used as sewers without ability to the owners of soil through which they run, the queson of constitutional protection to private rights may be forced pon the courts for decision. Until such enactment is made, owever, in clear and unambiguous terms, we shall be slow to old by inference or implication that it has been made at all. he authority granted to municipalities is to construct sewers, ut subject to the general legal restrictions resting upon such rporations forbidding the invasion of private rights by creaon of nuisance or otherwise. (Wisconsin, Winchell v. Wauesha, 85 N. W. R., 668.)

“ 7 When the legislature authorizes a city or town to contruct sewers, or to use a natural stream as a sewer, it is not o be assumed that it intends to authorize the city or town o to construct its sewers, or to so use the stream, as to create nuisance. (139 Mass., 389.)

“ 8 The doctrine that a municipality cannot be held liable for he consequences of an act which it is legally authorized or is equired to perform will not justify an invasion of private property, even if the invasion is only consequential. (R. I., 11-520.)

"9 A village or city cannot, by virtue of its right to drain surface water over lower lands, run its sewage beyond the corporate limits upon premises of an individual owner, where such sewage is offensive and detrimental to health. (Annotated Statutes, Illinois, 158-21.)

"10 There can be no proscription for a public nuisance. The right of a riparian owner to have the water of a stream come to him in the natural purity, or in the condition in which he has been in the habit of using it for purposes of his domestic use or of his business, is as well recognized as his right to have it flow to his land in its usual quantity. (Maryland, 1881. Woodyear v. Schaefer.)

"11 The pollution of a stream through use of same by a city for sewerage purposes without a legal right so to do, rendering water unfit for domestic purposes and the watering of cattle, and causing the emission of noxious odors, is a public nuisance. (Nolan v. New Britain, Conn., 1897.)

"12 A city's discharge of sewage into a stream in such quantities as to destroy the value of property of lower riparian owners, and to be destructive of health, is an unreasonable use of such stream. The right to maintain a nuisance by polluting a river, rendering it dangerous to the public health and destructive to the value of neighboring property, cannot be acquired by proscription. Merely granting a city authority by its charter to construct sewers to carry off the refuse of its inhabitants to a river does not make such use of said sewers a governmental act, freeing the city from personal liability for injuries therefrom, as from a lawful exercise of a governmental power. Pollution of a river by city sewers so as to destroy the value of property located thereon is a taking of private property for a public use, within the meaning of the constitutional requirement that just compensation shall be paid therefor; and no matter what the necessity therefor, the city cannot avoid its liability to render just compensation therefor.

A city's proscriptive right to pour its surface drainage into
iver does not include the right to mix therewith noxious
stances which the river cannot dilute or safely carry off
hout injuring private property. (Platt v. Waterbury, Conn.,
).)

13 It is objected also that the city has right to empty its
ers into river whatever the consequences. This contention
ased upon claim that it is a natural and reasonable use of
river, and that such right had been given by legislature in
horizing city to construct its sewerage system. The sewage
uestion, it is remembered, is discharged into a stream above
, and where the stream is not navigable. It does not
urally flow to the stream. It is gathered by the city in
ers from numerous buildings, cesspools, culverts and
ins, over a large area of land, and by uniform artificially con-
ucted grades is gravitated to and discharged into river. It
astly more than the mere natural drainage of riparian own-

I can not conceive of any tenable ground upon which
h drainage can be classed as either a natural or a reason-
e use of the river. It is not to be assumed that the statutes
horizing the city to construct sewers means to authorize a
sance. The authority conferred is limited to mere construc-
of the sewers in accordance with the maps. It does not
nse either public or private nuisances through pollution of
waters of the river. As to private rights, I need only say
t they have constitutional protection against any such legis-
ve enactment. In England, where the power of parliament
mnipotent in matters of this kind, both as to public and
ate rights, it is well settled that legislative authority to
ely drain into a stream does not authorize the contamina-
of the water. Legislative license to create a public nui-
ce of the kind considered, must be given in express terms, or
absolutely necessary implication. That the city has any
it to pollute the waters of a river by the discharge of its
age into them, is clearly an untenable proposition." (Chan-
or's opinion, Simmons et al. v. City of Paterson, N. J.)

From the above the attitude of the courts at the present time toward the pollution of water clearly appears. This attitude, which is of comparatively recent origin, seems not so much a stricter enforcement of the principles of common law as a better understanding on the part of the courts of the principles of sanitary science. The common law always existed, and was always enforced according to the lights of the courts, but the trouble was that those lights were not bright enough to illumine the subject. The brighter rays of modern scientific sanitation, however, have dispelled the gloom of ignorance and have pictured the subject in its true aspect, its importance and its necessities to the minds of those whose province it is to place it upon its proper legal footing. That this is one of the most important results obtained by sanitary science cannot be disputed.

You will understand that very many of the court decisions against the pollution of streams are on actions brought under the common law, and not under the statutory law. Therefore—the common law being uniform throughout the states, except when modified by state statutory laws—the decisions are fairly uniform, and state boundaries do not constitute a distinctive cause of difference between the decisions in the different states. The fundamental principle of the common law which underlies all these decisions is, as I have before mentioned, that the courts recognize in the quality of water an element of property, that a property right may exist in the *quality* as well as in the *quantity* of water, and that a property right may exist in the use and condition of water, as well as in real estate, or more tangible substances. Impairment of the quality of water flowing past the lands of riparian owners to the detriment of those owners, is actionable, and may be enjoined or indemnity obtained, or both, according to circumstances. The recognition of that right has now come to be substantially fixed, and, that being the case, you see that the decisions must necessarily all be one way, whenever the facts are shown that the property right is taken away or destroyed or injured by impairing the quality of the water.

I would like, then, to pass to the subject of New York laws.

NEW YORK LAWS

New York there are six avenues of approach to secure the ection of the purity of waters—six sources of protection. of these are under statutory laws; the sixth is under the mon law.

The statutory laws comprise principally the Public health ; and the first of the six means of protection is based on authority of the local boards of health.

nder sections 25 and 26 of the Public health law of 1893, the l boards of health are given authority—as you of course are aware—to abate nuisances within their respective munici- ties. Whenever the condition of a stream can be shown to nuisance, the local board of health has ample authority to e it, provided its jurisdiction extends to the point where nuisance is caused; if not, the local board of health, or local th officer may appeal to the State Commissioner of Health, the Commissioner may direct another local board of health ct in a certain manner, and thus the remedy can be reached rectly through the State Department. That is the first edy. It is available of course only when the condition of stream is a nuisance. Now, the establishment of the fact nuisance is sometimes difficult, occasionally impossible, where it is known to an expert or sanitarian that such nquestionably the case. That difficulty impairs to some nt the availability of this first method.

The second source of remedy or protection is in the power n to the State Department of Health to prepare rules and ılations for the protection of potable water supplies.

ections 70, 71 and 72 of the Public health law give the State artment of Health the right to enact rules for the pro- ion of public water supplies, which, when enacted and rced, protect them against pollution, without making it ssary to show an existing nuisance—you need not wait for pollution to occur; you have the right to prevent it. Those s have been enacted by the State Department of Health for reat many localities of the state, including the cities and ages of New York, Brooklyn, Syracuse, Rochester, Elmira, ca, Rome, Watertown, New Rochelle, Mount Vernon, New-

burgh, Middletown, Kingston, Saratoga, Port Jervis, Tarryto
Nyack, Oneonta, Peekskill and a number of others. The l
provides for the procedure to be followed in the enactment
enforcement of the rules; the responsibility and burden
making the changes and improvements needed to comply w
the rules, and the penalties imposed for non-compliance or vi
tion. The remedy in case of pollution is that the officer or offi
of the municipality or of the water company, whose wate
protected, is given a status in court to apply for enforcem
of the rule, without, as I said, having to show that pollu
actually occurs. The violation of the rule is the thing legisla
against—not the creation of the pollution. If a thing, theref
promises danger, it is sufficient to constitute a violation of
rule; it is not necessary to wait until the pollution has actu
occurred. The trial of the case will therefore be on the me
as to the violation of the rule, not on the existence of the imp
condition of the water. This law is thus seen to be prevent
rather than simply remedial.

The violations are classified under two distinct heads: First
Those of a spasmodic nature, such as the throwing of a de
dog into a reservoir, or other sudden, spasmodic occurrence o
the one hand, as compared with a continuing violation, such a
the maintaining of a manure pile or cesspool within the prohibited limits of distance on the other. The penalties are
definitely adjusted to those two classes of violations.

3 The third source of protection to the waters of the state
is one that is peculiar to this state, and is a very unusual one:

Under section 6 of the public health law, the governor of the
state is given very unusual prerogatives: On petition to the
governor from any individual of the state, claiming that
nuisance or a condition detrimental to health exists, the
ernor may direct the State Department of Health to
investigation. If the result of the investigation deve
unsanitary condition, a report is made to the governor,
the power to order its abatement. In the order of ab
and the order of its enforcement, he may require the
attorney, sheriff and other officers of the county to t
necessary measures to execute his order. This law ha

cessfully in a number of cases in the state, but I think
se has the governor had to resort to the power vested
ınds of invoking the sheriff to enforce the order. The
able case of that kind has been that of the protection
ga lake from pollution from sewage and manufacturing
An order was issued by Governor Roosevelt against the
lities of Saratoga Springs and Ballston and against a
of manufacturers and summer hotels and resorts on the
far as the summer hotels are concerned, the order has
aplied with in nearly every case. In the case of Sara-
ings the order is being carried out in good faith, and
ge has been expending about $100,000 in obeying the
t they have had to expend it in the same way that
er did, namely, in undoing improper procedure; in sepa-
s storm-water from its sewage, and also in reducing
aous water consumption and resulting volume of sewage
ated. About $50,000 has been already expended in these
iminary steps and about $100,000 will be spent in the
tion of disposal works, now well toward completion.
er of the sheriff has not been required in this case to
ompliance with the law, though perhaps in the cases of
ge of Ballston and of one or two parties who have not
plied with the order, it may be necessary to resort to
ieasures.

fourth source of protection lies in the power given the
epartment of Health to approve sewer plans for incor-
villages, under the general law for incorporated
*

the public health law, section 21, and under the village
tion 260, villages, before taking any steps toward the
of a sewer system, are required to submit plans to the
epartment, for examination and approval; and in that
the State Commissioner has it in his power to dictate
as upon which the sewers shall be built. If the Com-
er find a stream is in need of protection, he will not
of the discharge of sewage into that stream, without

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nendment to the Public health law passed in 1903 this requirement is extended
cities and to all other sewers.

adequate treatment. The village law of 1897 also recognizes this requirement, and in the passage of the new law of a year ago (chap. 348 of 1901), which provided for the establishment of sewerage districts in unincorporated villages, the same requirement was added.

5 There is another and the fifth source of protection, constituting the last under the statutory laws, and that is in the fisheries law. Section 52 of the fisheries law reads as follows: "No dyestuff, coal tar, refuse from a gas house, sawdust, shavings, tanbark, lime or other deleterious or poisonous substance shall be thrown or allowed to run into any waters, either private or public, in quantities destructive of fish inhabiting the same."

It is the duty of the State Forest Commission to enforce that law. How far they have done so, I am unable to say. It is a very good law and should accomplish a great deal of good. The fact that it is pinching somebody is shown by the fact that last winter a bill was introduced providing for the amendment by the insertion of the word "salt" before the word "waters." The bill did not become a law, but it indicates the degree to which efforts to evade a healthful law will reach.

6 The last and sixth source of remedy in New York state is that of the judicial decisions of the courts, based mainly, as I have said, on the common law.

The most striking of the recent decisions in this state bearing on the question of the purity of waters are as follows. I will cite a few of them.

The first is that of Falconer v. Jamestown, which was one of the first in this state to recognize property right in the quality of waters. The plaintiff complained of the pollution of Chautauqua outlet by the sewer system of the city of Jamestown, and the court granted an injunction. The city obeyed the injunction by changing its place of discharge, expending for that purpose about $90,000. In that decision, in commenting on one of the points of the defense, the defense being set up that an injunction should not be given on account of the fact that the water was already polluted from other sources than the city, the court held that the existing pollution from other sources did not constitute ny defense for the pollution by this particular defendant, and he other sources of pollution could be dealt with when suits ere brought against them.

The next case was really an older case — that is, older in its rst trial, but more recent in its decision by the Court of ppeals — being that of Schriver v. City of Johnstown, which as brought by the proprietor of a pond for injury of the waters f his pond by the discharge of sewage from the city of Johnsown. That went from the referee's court to the Court of ppeals, and occupied something like six years in the litigation, nd it was only in 1896 that the final decision of the Court of ppeals was reached. Their decision was in favor of the plaintiff, s it had been in each of the lower courts. The court gave decision carrying an indemnity and costs, and also gave an junction. The two parties to the litigation then, after the cision was rendered, effected a compromise by which the city Johnstown was permitted to continue its discharge of sewage to the pond, by paying to the claimant an annual sum, which as fixed by the parties at the outset at $600 a year, the court pproving of the contract. A year or two ago the complainant ruck for higher compensation and added $500 to the first mount, so that the city is now paying $1100 per annum for the spension of that injunction.

The next case is that of Baker v. The George West Company. aker was a riparian owner on Cayaderoseros creek, one of the ibutaries of Saratoga lake, and the company was polluting the tream from its sulphite pulp mill. The decision was against e defendant, and damages were assessed and later affirmed by e Appellate Division. The defense was not so much a denial f the pollution as a contest as to the portion of the total polluon that this particular defendant was responsible for. The ourt recognized that it was not responsible for all of it, and djudged the compensation in accordance with that view.

The next and last case I shall cite is that of Mann v. Willey, at being a case of rather unusual interest from the fact that e stream itself is one that lies away up in the Adirondacks, ree or four miles from even a stage station, and remote from ordinary civilization, occupied only as a summer resort. The stream was a beautiful mountain stream, on which the complainant owned a summer cottage, the stream being used for bathing purposes and for running a small turbine. The defendant in this case was the proprietor of a summer hotel, whose sewage had been discharged into the stream, and this impaired the appearance of the stream and its suitability for domestic purposes.

The court gave a decision against the defendant, granting an injunction and giving nominal damages, as only nominal damages were asked for. The decision was based not on the ground that injury was caused to the bathing and turbine, but the evidence had shown that the water was rendered impure for domestic purposes. Although the plaintiff had not used the water for any such purposes, the court gave the injunction and it has been obeyed.

Those are a few of the New York cases that I shall cite in this paper, but they are entirely in accordance with others which might be cited at the present time.

So much for the present condition.

In spite of the numerous laws, we need another law, which shall be more effective in stopping the increase of pollution. Ultimately we shall have to abate present pollution, but at present we shall be thankful to stop the increase of pollution. The other will gradually follow.

A law to accomplish that was introduced last winter, but too late in the session to receive careful consideration. It will probably be presented again this year. The law in question does not attempt to interfere with the present disposal of sewage in streams; it simply asks that no further discharge of sewage and manufacturing refuse in the streams shall be permitted except on a specific permit issued by the State Department of Health. The law contemplated the fact that certain cases might arise in which it may be proper and best to permit the disposal of sewage or refuse from certain towns or certain mills in certain streams, and makes it possible for a town or mill so situated to secure a permit, on hearing before the State Commissioner, the permit to be a specific one, granting a specific right, and open

ɔcation whenever the situation changes from what it was
time the permit was given.

law does not apply to any existing disposal, but it carefully
alously guards any increased disposal of sewage and man-
ring waste.

re would seem to be no reasonable objection to that law.
ı law which does not interfere with vested rights, but
to prevent encroachment on property rights in streams.
ply makes it difficult or impossible to encroach further
field of sufferance, which is the only way by which pollu-
as been permitted in the past.*

ught to be the interest of every member of this confer-
and in fact of every health officer of the state, to lend
l in favor of the passage and enforcement of every sort
slation that will tend to enhance and improve the general
ry conditions of the waters of the state, because, while
ı not necessarily the most important, it is one of the
ıching sources of unsanitary conditions, and one about
there would seem to be the least difficulty in securing
ement and beneficial results.

ank you, gentlemen.

William H. Guilfoy, Registrar of Vital Statistics, New
city, read the following paper on

VITAL STATISTICS

ıet before you, gentlemen, a dish composed of a conglom-
n of death, birth and marriage rates, seasoned with
lings of age distribution, sex, and occupation influences,
with sauce a la United States Census, is far from my
se. The thought that a few words of mine might aid in
loption by this representative gathering of the Interna-
or Bertillon System of Classification of Causes of Death,

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law has since been passed as Chap. 468 of the Laws of 1903. It requires
ɔ be filed for all sewer systems and manufacturing establishments which were
ng sewage or manufacturing refuse into any of the streams in the state at the date
sage of the law; and it prohibits any discharge of sewage or manufacturing waste
sewers or establishments unless a permit is first secured from the State Commis-
Health. Penalties are fixed for violations, and it is made the duty of each local
health to see that the law is enforced in its municipality.

impelled me to forego the pleasure of browsing in the broad field of Vital Statistics, and to turn my efforts in direction of an appeal for the adoption of that system.

As you all know this system as agreed upon by the representatives of European and American officials in the Congress assembled at Paris in August, 1900, went into effect in the countries represented, on January 1, 1901, the beginning of the century. The classification is one that to my mind represents the product of the energy, talents and indefatigable exertions of most of the best minds in this line; years of hard work finally rounded out and presented it to the registrars and health officers of the world for their adoption as one that although it possessed some faults, its merits were so many and so prominent, and its application so easy, that it would be quickly seized upon as an improvement upon its predecessors and adopted by all the countries, states and cities laying claim to the possession of a board of health, a health officer, or a registrar.

The intrinsic value of this as compared with other classifisations is,

I. Its exactness. Each cause of death includes under it every disease which should be included, and excludes those which should be excluded. This definite and positive amalgamation and segregation places the registrar in such a position that he feels no hesitancy in classifying under their proper headings the numerous causes of death reported to him. If a certificate of death be presented to him, upon which the cause is stated to be any of the following—enteric fever, typhus abdominalis, continued fever, ataxic fever—he classifies it under title No. 1, typhoid fever. If any of the following be reported as a cause of death—diphtheric angina, pseudo membranous angina, infectious, malignant or toxis angina, pseudo membranous laryngitis, malignant laryngitis, pseudo membranous bronchitis or diphtheric paralysis—he places them under the title No. 9, diphtheria and croup. He excludes from under this title stridulous croup, spasmodic or false croup. So it goes on through its 179 titles.

[. Its comparability. The classification is as exact as it can
sibly be made, and reflects an up-to-date recognition of
lical and surgical progress. It renders the causes of death
ely comparable with those of other countries, states and
es in which this classification is in use. This is considered
some, and justly so, as its greatest merit. Is there any one
sent who would be bold enough to deny that a uniform com-
ison of the vital statistical reports of the cities of this state,
with the other, is not a consummation devoutly to be
hed? And if this uniformity may be procured by the pas-
e of a recommendation or a resolution favoring the adoption
this system by the registrars and health officers of these
es, do we not owe it to our godmother state, who stands
nsor for us, and our mother cities who honor us by appoint-
it or election, that our best efforts be directed towards the
omplishment of this end?

ook at the monthly reports of some of the cities of the state.
one of the largest cities of the state the classification is
ed on neither an anatomical, etiological or diathetic basis,
simply on the school-boy plan of naming the diseases in an
habetical order; and in another, a smaller one, the same
is true. It is undoubtedly a labor saving task for the regis-
r and the printer, but it is not scientific; it reflects not the
it of research which pervades the age; it savors of the days
umors.

nother of the large cities possesses a classification which is
erior to those just mentioned, inasmuch as it is based upon
ombined etiological and anatomical foundation, though
s puzzling to find that it includes colic and gastric catarrh
er the zymotic diseases; duodenal ulcer and thrombosis
ong the constitutional diseases; pulmonary embolism among
tubercular; abscess and spinal concussion among the ner-
s; influenza and acute rheumatic fever among the respira-
y; cerebral hemorrhage and tetanus among the digestive;
, horrors upon horrors, locomotor ataxia, uterine fibroids,
betes mellitus and mitral insufficiency among the urinary.

Is there not pressing need of reform in this classification? Another of the large cities possesses a fairly good classification, one with which fault may be found in placing some diseases under a heading which later day medicine would remove and place in a more appropriate class.

This system was adopted by the department of health of our city, and went into effect on January 1, 1901. The system it superseded was that known as the Registrar-General's Classification, and we found that the Bertillon was such a thorough one that it was an easy task to put it into practical working; it rendered comparable the figures of past years with those of the present, with a few exceptions. Within the past few years the question has arisen as to the increase of cancer since 1880, and the statisticians have debated among themselves as to whether this increase was a real one or a statistical one. The gross figures show an immense increase; in some cities the figures are trebled. Naturally the cause was sought for. The influence of medical and surgical progress would seem to account partly for the increase, especially the operation of laparotomy. Another cause was probably due to more careful certification as to the cause of death. The question then revolves around the seat of the cancer—was the increase in the accessible cancers, or vice versa? Some few of the cities and states of continental Europe were in a position of furnishing death rates of cancers of the face, of tongue, mouth, breast, and uterus, on the one hand, and of the liver, stomach, kidney and bladder on the other hand. The death rates of the accessible cancers had not increased. The figures produced served to throw considerable light upon the question. The Bertillon classification specifies the seat of all cancers; I simply mention this as an argument in favor of this system. Why should not the causes of death of the city of Buffalo be immediately and strictly comparable with those of Rochester, Syracuse or Auburn? Is there any good reason extant as to New York city possessing a different classification to that of its sister cities? The Bertillon classification points out a path for us to follow; it provides for local titles and sub-titles where necessity arises;

t provides for a decennial revision, that the present seven-eague strides of progressive advancement in medical and surgical knowledge renders imperative. Are we to set at naught the resolutions and labors of such a representative body as the American Public Health Association? The work of the Public Health and Marine Hospital Service in this direction should be encouraged. Is the greatest country of the world to continue to be a subject of statistical reproach among the vital statisticians of the world? And is the greatest state of the greatest country to take no steps to place itself in touch with he efforts being made by states, cities and individuals for the obliteration of this undoubtedly deserving slur? Perish the hought.

Dr. Lewis—The Conference will be pleased to hear Dr. O'Leary, of New York city.

ADDRESS OF DR. O'LEARY

Mr. Chairman and Gentlemen—Rather than a discussion of the title of the paper, I will say a few words in seconding the efforts that Dr. Guilfoy is making to have this universal system of classification, known as the Bertillon system, adopted by the state of New York.

The value of the science of statistics cannot be over-estimated, as it lies at the root of history; for had the statistics of the Roman empire been kept, we would now possess more than half the historic records of those interesting times.

It is only since a due estimate was set upon the statistical returns of the leading cities of the world that the progress of sanitary science has been marvelous and substantial.

To prove that a suggested remedy for municipal hygienic shortcomings was productive of results, there is but one way, and that is by the inexorable law of figures. London, Paris, Edinburgh and Berlin, together with our own teeming centres of population, such as New York, Chicago and Philadelphia, would not now exhibit a per cent of mortality so vastly encouraging were it not that statistics proved the invaluable character and efficiency of public sanitation.

An adequate supply of pure water, the proper ventilation of dwelling houses, an abundance of fresh air made possible by the provision of the public parks, happily termed breathing places, have mainly combined to those happy results and statistics above have demonstrated this truth.

But in order that the science of statistics should accomplish all that falls within its purview, it should be cultivated and carried out in accordance with the best and most reliable methods. Now it is a universally admitted fact that the best results are obtained in all branches of science where there is a uniformity in methods of research; and this applies particularly to the science of statistics, for it seems that where a system of classification can be formed that embodies all that we wish, it is our duty in the interest of the common good to adopt it. The consensus of opinion among statistical experts the world over endorses the Bertillon system of classification of diseases as incomparably superior to all others. It is simply an advantage of inestimable benefit; it is reliable, and it is eminently scientific; based upon the accepted data of pathology and etiology of disease.

Its principles are fixed and uniform and are not subject to the arbitrary ideas of innovators. In the light it sheds upon every phase of disease and on the influences that promote or hold it in check, it enables our municipal authorities to deal with the great problems affecting the physical welfare of the community intelligently and effectively.

The leading cities of Europe have cordially endorsed it by adopting it unanimously. Paris, London, Berlin and Vienna bear testimony to its efficiency and value; and our American authorities gladly welcome the statistical tables of those great municipalities because they are replete with valuable and practical information.

We there read the fluctuating record of human life as influenced by modern science in opposition to the ignorance and folly of ages gone by. Unfortunately, our own country has been slow in realizing the immeasurable superiority of this system over the crude and antiquated systems that have proved so barren of results. In Greater New York alone in our own state rtillon's system of disease classification been adopted, ɜre consequently we are in a fit condition to appreciate ıntages.

ɾe pointed out in a few words the superiority of the ın system over all others, but my main purpose in ng before you is to show that its adoption will effectually end to the confusion, trouble and delay that now so ıgly spring from the effort to reduce to order and give ıomogeneity to the slip-shod methods of keeping vital cs of our state as found in the towns and villages under isdiction of the New York State Department of Health.

ɔlea, therefore, that at least the cities, towns and villages Empire State should adopt the Bertillon system of classiı is eminently rational and fully in line with the progress times. No one who at all appreciates the value of statisıta as applied to modern medical science will hesitate to e that its value in the all important branch of vital cs should be adopted and enforced with the sanction and ity of the state legislators.

ınk you.

ɹewis—Dr. Byrne, of New York city.

Byrne—I have nothing to say at present. I would like to ıe matter discussed first, and then I may have something

Lewis—Dr. Wilbur of Michigan.

Wilbur—Mr. Commissioner and Members of the Conɘ, I have been greatly delighted in hearing these remarks international classification. It has been a matter of ɜ conflict for registrars to agree upon this form of classifi. It represents a struggle of over fifty years, and perɾ, with me, the adoption of this international classification ents a continuous effort for some five years past.

397, at the session of the American Public Health Associaıt Philadelphia, the committee on vital statistics recom1 the adoption of the Bertillon classification as soon as it could be revised; and as the result of this revision, held at Paris in 1900, the United States and twenty-five other nations of the world united in the adoption of the revised international classification, to begin in the year 1902.

This classification had been accepted by every registration state in the Union. I used formerly to exclude a single state, that of New York, but I had a very pleasant interview with your Commissioner of Health, at New York, last year, when he informed me that the state of New York had agreed with the other registration states of the Union in the acceptance of this system, since which time I am very glad to say that every registration state in the Union accepts, for its state work, the international classification.

Nearly all the larger cities of the country also accept this classification, and among the first of these cities to come out in favor of it was the city of New York, under Dr. Tracy, at that time, whose worthy successor, Dr. Guilfoy, has taken up the work that he left.

Now I ask what is the reason that all the cities of New York can not accept the system of classification that has been adopted by Manhattan and Greater New York. Why not have them uniform—have that uniformity which is so desirable?

And another reason I might say is that the departments of government at Washington have also accepted this system. I have in my hand a manual which is issued by the United States Census Bureau for the year 1900, and they will publish each year the statistics of all the registration states and cities, compiled according to this classification. In this manual, which any of you registrars or health officers can obtain by writing the director of the census at Washington, you will find a compilation of every cause of death of over 2,000,000 deaths reported to the census bureau. So this should be materially useful to New York registrars. This is presented not as a finality, because the classification, like the sciences, is progessive, and we expect to improve. There is a provision in this classification for a well designed revision. A committee has been appointed by the session of the Boards of Health of North America, whose sessions

I attended in New Haven two days of the present week, to further the work of securing uniform statistics and also presenting tables in substantially similar form in the reports of boards of health. I wish that a similar committee might be appointed by this conference, to co-operate with that body in this work.

I thank you very much for the kind hearing you have given me and I hope that the health officers and registrars in New York will heartily co-operate with the government officers and officers of the registration states of the Union in the work of procuring reliable and thorough vital statistics.

Dr. Lewis—We would be pleased to hear from Dr. Henry M. Baker.

Dr. Baker—Mr. Commissioner, I have nothing further to offer only to approve very warmly what has been said along this line. I think it is very desirable, indeed, and I hope that all of those who have had to deal with the subject will agree that this is a movement which should go on.

Dr. Curtis—Mr. Commissioner, the matter that is before us is one of much importance. It is impossible to deal with masses of statistics without having some system of classification. The adoption of this system has been so universal that I have no doubt it will be the one that scientific registrars will continue to follow. The fact, though, seems to me very apparent that it is not flawless, so far as it has been proposed. I have not given it so very much attention recently, but just looking at the classification as I see it—not that the objections that I might make were sufficiently grave, perhaps, to be vital—but it seems strange to me that, having passed under the review of men of the capacity that it has, it has included some things which seem to me incongruous. I have just marked a few as I have passed down the list.

For instance, under the second heading of "General Diseases," the first article, No. 20, is "Purulent Septicemia and Infection." Probably in the fuller list these are defined, but there is pyemia and sapremia, without definition as to whether they are puerpal or what the original cause is.

I note under the second category of "Local Diseases"—and by the way the system in general plan differs little from that proposed long ago by Dr. Farrar, although it is very much simpler, to be sure — under the diseases of the nervous system is included "Epidemic Cerebro-Spinal Meningitis." I think in the revision of 1900, in the title of Epidemic Diseases, the title "Epidemic" was changed to "Communicable." It seems hard to find a proper word that should cover all of them. Why "Epidemic Cerebro-Spinal Meningitis" should be excluded from there and be put in Nervous Diseases is something that I have never been able to comprehend. It is a disease that we have followed the course of in this state with some interest. In different localities it has seemed to be epidemic. We are interested to know what, in the course of years, the statistics of this disease will continue to show. If swallowed up in the general category of diseases of the nervous system, we lose entire track of it, unless it is separately recorded. I don't see why it should not have been kept along with the other communicable or general epidemic diseases, why it should be placed where it is, especially when the propriety of placing it in communicable diseases group is emphasized by the needless prefix epidemic to its title.

I see "Tetanus" put in the same category, without definition as to its source at all.

Of more vital interest to me is the class of respiratory diseases, in which, along with acute respiratory diseases are included chronic respiratory diseases, and "chronic bronchitis" being especially mentioned. Now this and all chronic diseases of the lungs have relations quite apart from acute respiratory diseases. It is interesting to us as sanitarians, whose first interest is the recording of sanitary affairs, to keep a separate record of acute respiratory diseases, and these should not be confused by including chronic diseases of the respiratory organs with them under one head.

Still more incongruous to my mind is retaining in diseases of the digestive system "diarrhea" and "enteritis." I have no objection to including chronic diarrhea, but acute diarrheal diseases ought to have been excluded from that category. They belong in the first order of general diseases, and should not be swallowed up in the list of digestive diseases.

I do not see the propriety of the class of diseases of the genito-urinary system. There is no relation between Bright's disease and ovarian cysts, for instance, and why they should all be classed together, and why we are to swallow up, in one mass, diseases so different from each other — diseases of the breasts and diseases of the ovaries, and put them with Bright's disease or renal diseases — why we should not have a class of diseases of the kidneys apart from them is incomprehensible. If we are to classify, let us class together diseases having definite relationship.

"Diseases of the skin and cellular tissue" is an unnecessary group. We want a separate record of one of its members, erysipelas; we want to know where it is located and under what conditions it prevails, but it is very much less of interest that we should know about gangrene, carbuncle and acute abscesses. I should do away with that entirely, and class erysipelas in the first category of diseases, where it rightly belongs, in the communicable group, and put the rest elsewhere, for they are not worthy of separate record.

The eleventh group, "Diseases of Infants," is too indefinite.

These are a few of the criticisms that are conspicuous. They are not academic but practical objections, and interfere materially with the record, classification, the disposal into classed form of a mass of material that we have coming to us, as the returns by boards of health and by physicians, as causes of death. If there is some way in which these can be made clearer, so that we can get a more definite arrangement, it seems to me it would be desirable.

It is highly desirable that some general system should be adopted, and probably no other system at the present time is in a general way as good as this; and I am glad that it is, as it were, adopted by this Department of Health. It would be desirable that all the cities of the state unanimously follow out one general system, so that there could be comparison. This system can be amended in use along certain lines without material interference with its use.

I think sometimes these things are adopted by a mass vote, without due consideration by the body asked to endorse them. I have no doubt that often things of this kind are presented to an audience, and there are not six people in the gathering who have ever given it careful consideration. This has been very likely the case with not a few bodies which have endorsed this system. I would not say but that it has been subjected to careful scrutiny by men who certainly knew what they were thinking of, as it certainly has; but I submit, unless I am in error in the understanding of it as it is, whether there are not objections which eight years from now should be remedied, and which now in practical use should be corrected by a system of special record of numbers of individual diseases.

Dr. Lewis—It appears to me, although I have not given it the careful consideration that Dr. Curtis and a great many others have given it, that this is simply an index. I have had something to do with making indexes. Very few indexes are complete, and we are always coming across subjects that we don't give under a certain head. It is not always easy to classify them, and yet our index, as an index, is invaluable, and the index may be improved. As I understand, this may not be changed till eight years from now, as it is to be revised in ten years from the time of its adoption.

Dr. Wilbur—It is to be revised once in ten years, but on some minor matters we have power to act.

Dr. Lewis—So that, if our index is incomplete and inaccurate in certain parts, it may be corrected before the decennial revision. I never looked over an index in my life (that is one made under my direction) that I didn't see a good many faults in; at the same time we continue making our indexes, and they are exceedingly useful.

I wish somebody else would talk on the subject and give me some light. I may have to decide this matter some time.

Dr. Wilbur—I would like to refer to a few remarks made by Dr. Curtis. I am very much pleased with his statement on the whole, and cordially agree with his expressions in many instances.

his is not as perfect as it ought to have been for the reason : this country was not quite as fully represented at the inter-ional revision as it should have been, so that the opinions American registrars were not, perhaps, given their full ght. That was not the fault of the international classifica-ı, but arose from the fact that vital statistics were not perly organized in this country at that time, so that our vs could be thoroughly expressed.

a the matter of "Epidemic Cerebro-Spinal Meningitis," I ee that that ought to be among the general diseases. It is, 'ever, difficult in handling returns to know whether they ıally mean that it is Epidemic Cerebro-Spinal Meningitis; as the disease was of somewhat less consequence in Europe, y decided to give it as simply "meningitis" in ordinary es, and when it was epidemic, add that word; but it could lassed among the general diseases if you desire.

a regard to diarrhea and enteritis, it is quite similar. Dysen-r was formerly included in the general system, but was asferred. I presume at the next revision that diarrhea or te diarrhea may perhaps be similarly treated.

iseases of the skin and cellular tissue I do not think amount ınything as a special class. All our systems, not only the rnational, but the general system, are filled with minor ses that don't cut any figure.

rysipelas was transferred at the last session to the general ases.

ur classification is faulty; so are all other classifications, more countries and states and cities have united in this, it is thoroughly representative, and all the faults can be d at the next revision, so far as our knowledge goes at that e. This manual of International Classification of Causes of ıth can be obtained by addressing Hon. William R. Merriam, ector of the Census, Washington, D. C.

r. Sheldon—I took a hard cold here yesterday and I don't w that I can speak, but I wanted to say a word regarding law, which it seems to me should be changed. This sub-t of vital statistics will have to go before a committee, and ink the committee should be appointed.

This matter that I speak of is different—in our town, in Lyons, we have a town clerk the same as in all the towns of the state. He is elected every two years and has an office in a good brick building, has a good safe and has a place to keep valuable papers, and is the registrar of the town. We have a village board of trustees who seem to think that they have the right to appoint a registrar, and which they do. Every year they change it as a rule, and some girl, young lady, living in the suburbs of the village is made the registrar of the village. These papers are kept in a private house without much care. It seems to me this is wrong. The town clerk has the records to keep of the whole town, and he should do so instead of having two registrars' offices in the town. If we have any legislation, it seems to me that there should be something done against having two registrars for a town.

Dr. Lewis—The original certificate is filed in his office, so that it is in a fireproof building and carefully guarded.

Dr. Sheldon—I understand, but people come and want to see the records of the town. They go to the town clerk and expect to find them there, and they don't find them because one-half or two-thirds of them are somewhere else. It seems to me that those of us who live back in the woods, you might call it, are handicapped by the law, which, as I understand it as now in vogue, allows justices of the peace to issue death certificates. It seems to me as long as that law is in vogue that the Department of vital statistics, their records, are going to be very incomplete, because a man who hardly knows A from B is hardly responsible in making these returns, no matter what or whose classification he may have.

Dr. Lewis—The physician makes out the death certificate.

Dr. Sheldon—I understand that, but in talking with some of the physicians here near me, they say, and I have known of its being done in the town in which I reside, that the justice of the peace issues the certificate, and from that he makes the burial permit—whether that is the correct method or not I don't know. I think there should be some hard and fast rule in regard to that matter. In some towns of course, the town clerk would evidently be the proper man, and there are many instances where the town clerk is wholly, you might say, incompetent to perform the duties of registrar. I know in my town we have had town clerks who could hardly write a legible hand, and they are wholly disqualified for that work.

Dr. Lewis—This Department is perfectly conscious of the shortcomings of some registrars, but not anybody that is here of course (laughter); but the attempt is made and faithfully made, to secure a correct certificate. We return hundreds of them every month for correction until we get a satisfactory certificate. I presume you have the same experience in returning certificates for correction.

Dr. Goff—The gentleman's point is very well taken. As the coroner of the county of Steuben I find that a great many certificates are sent to me for certification where people die suddenly or are found dead—and the justice of the peace or any reputable person living in the town or vicinity may sign that certificate according to law, and it is not sent to me for confirmation, and it is turned into the Department here. The cause of death is guesswork. A man is found dead and they send it in generally as heart disease. In that way you will find your vital statistics are changed materially, for heart disease enters into the mind of every justice of the peace when a man is dead.

Dr. Shattuck (of Westport)—I am from the rural districts. I will tell you how we do it up our way. The town clerk keeps a record of all marriages, births and deaths. Every doctor in the town has to report within a certain number of days any death or birth that he attends, and the town clerk on the fifteenth of the month makes his return to the Department at Albany. I have never seen many papers come back to us. In the case of a sudden death, if the coroner is not accessible, the health officer views the body and gives the permit and has the certificate made out. We have no trouble up there. The coroner lives ten miles from the town clerk, and we get them there and try to fill out these records as perfectly as we can. I am perfectly familiar with the office and go in there nearly every day and look them over and touch up the town clerk a little.

Dr. Lewis—I don't see any difficulty in the way of the town clerk acting as registrar providing the attending physician files with him a proper certificate. The law is in your own hands, and if you have physicians who fail to make proper reports you can bring them to time—there are ways of doing it. It has been done in New York city, but there is no occasion to do it very often now. We report everything except stray cases of tuberculosis, which we sometimes forget to report, but otherwise the records of New York city may be taken as a model.

The records of the state have so vastly improved that, so far as we are concerned in the office, we feel satisfied that the progress is rapid towards a reasonable degree of accuracy.

Now if this system, this Bertillon system, is going to aid us if we adopt it, if we practically follow it, if it is going to aid the classification of disease by adopting it literally, and wait for the corrections that are bound to be made from time to time, that is what we want to do. Therefore we are getting information to-day from Dr. Guilfoy and others regarding it.

Are there any others who wish to discuss this particular paper of Dr. Guilfoy's? I see the clock is moving and we have two more interesting papers yet to listen to.

Dr. Willard—I have nothing to offer on the paper, but I would like to ask a question. The law provides that physicians are entitled to a certain fee, I think, twenty-five cents, for making out returns. They are allowed thirty days in which to make those returns. The question has arisen with us whether physicians could collect anything if they failed to comply with the law and do not return those certificates until after the thirty days have expired. With us it is customary—our board of health requires physicians to have their bills audited or approved, O. K.-d by the health officer, and I have declined to O. K. items where they were over thirty days.

Dr. Lewis—I am not able to answer that question.

Dr. Phelps—I simply want to ask one question, and that is in relation to the physician making out a statement of the cause of death. I cannot understand, according to our present law, how it is possible for a justice of the peace or town clerk to make out or see that there is made out or cause to be made out a burial permit with the cause of death of the patient stated in the same. I cannot understand how a physician has thirty days to make out this report.

Dr. Lewis—That is for filing here.

Dr. Phelps—Yes; he may have that time, but I don't see how it is possible for a justice of the peace or town clerk to make out the cause of death. If the death occurs in the country and some distance from a justice of the peace, he can't get there. It is the duty of the physician (if it is the health officer, all right, and if not, it is the duty of some physician) to go there and ascertain the cause of death, so far as he is able to learn from the friends of the deceased.

Dr. King—A gentleman here says if there is no attending physician and somebody dies, that it is the duty of the health officer to ascertain, if he can, the cause of death. If that statement is correct, then I have never before been aware of it. I supposed it was the duty of some parties who might know the person dying, if no physician was in attendance, to call the coroner. I would like to be informed upon that point.

Dr. Lewis—That is the way we understand the law—the coroner is to give the certificate of death, or the examiner (?) in Erie county, who takes the place of the coroner.

Dr. Willard—We all know the law provides that where there is a physician in attendance he signs the certificate of death, and if no physician is there, the coroner does it, and if no coroner is called, any reputable person can make affidavit as to the cause of death and upon that the registrar issues the permit to bury.

Dr. Lewis—Is there any county without a coroner, except Erie?

A Delegate—Yes sir, the county of Nassau. The justice of the peace acts in place of the coroner.

Dr. Willard—It is not an absolute necessity for a coroner to be a physician. What will you do then? Is not the law, as I have stated, for some reputable person who knows the person who died—some one well known in the community, or a justice of the peace, to fill out the certificate if he chooses, providing the physicians are absent and there are no circumstances which might give a criminal touch or color of suicide to the question.

Dr. Lewis—Not being a lawyer, I can't say.

Dr. Willard—I believe it is the duty of the coroner to find out the cause of death by any reasonable means in his power, and if there are friends, the coroner should find out from them.

Dr. Guilfoy—We have digressed somewhat from the subject of my paper. Although I am very much interested in the questions that have been put here, I am unable to answer them.

In the city we have very little trouble in getting accurate causes of death. Occasionally we write a letter. Our records down there are becoming more valuable every day. Last year we issued over 25,000 transcripts of births, deaths and marriages, which are used in the surrogate's court, some in the criminal court and in the courts of civil procedure.

What I arose to say, and I will only talk a few minutes, is to say a few words answering Dr. Curtis' criticism. Erysipelas is not classified among the skin diseases, but put among the general diseases. It is given a title by itself. It is of such moment that it ought to be given a title by itself, and they therefore did so.

In regard to chronic bronchitis, the system does not include it under the acute respiratory diseases.

In regard to cerebro-spinal fever, as I call it—epidemic cerebro-spinal meningitis as it is called here to-day—I agree with Dr. Curtis that it is hardly the proper thing to put that under the nervous system, but it should be in the general diseases; but it seems there is a provision for keeping the figures in regard to the total, and the ages, sex and color in the classification for "Epidemic cerebro-spinal meningitis."

I thank you all for your kindness.

Dr. Lewis—We will now have the pleasure of listening to a paper by Dr. Curtis on "The Technique of Vaccination."

TECHNIQUE OF VACCINATION

BY F. C. CURTIS, M. D.

Enough care is not given to this simple operation. This is my excuse for presenting it to the attention of the assembled health officers. Much of the disfavor which has still to a moderate degree to be encountered towards vaccination is perfectly unreasonable, but it would be robbed of such of it as is reasonable if there were no bad vaccination.

I will not try to speak of all the illustrations of bad technique, but two instances come to my mind which serve as types. I one day saw a health officer vaccinating in his office a lot of children. He had a little pot of glycerinated virus, and into this he dipped the point of his lancet which he had wiped off with a bit of cotton after use from the preceding case. The children rolled up their sleeves, and came one after another as they were; but I don't mean to speak of the failure to clean the arms or to be strenuous on that point, but only to emphasize that an unsterilized instrument was dipped into a liquid mass of virus which with each dip was probably freshly charged with new flora of the undesired bacteriological kingdom.

One other case which will stand for many is an illustration of a badly chosen site for vaccination. It is that of a young woman with a long, lasting, non-healing sore on the calf of the leg following vaccination. She had various other cutaneous ills remote from this point which followed, though I am not prepared to say they were due to it. But the vaccination had been done by a most reputable physician—and I have seen many such instances—and the trouble was chiefly that the site had been badly chosen. It is exceedingly common to vaccinate female infants on the calf of the leg, which is a bad practice, but it is very much worse to choose this site for adults.

The exactions for good vaccination are not great, but there are some which I think should be always observed.

1 *The site for vaccination.* I will speak first of the desirability of choosing the best place to vaccinate. There are good reasons for saying that the arm should always be the site chosen for vaccinating. It is most *accessible* for performance and subse-

quent care; it can be best protected from injury during the time that the vaccine sore is active, especially from the pressure of clothing, and the circulation is more active, so that the processes of nutrition and repair are more readily carried on than in the dependent parts of the body.

But of chief importance is to select a site free from underlying muscle, since with every movement of such muscle the overlying skin is put on the stretch and a source of unavoidable irritation by tension and pressure upon the inflamed point. This is the chief reason why the calf of the leg is a bad site. On the shoulder over the deltoid muscle is likewise bad, or over any powerful muscle, the use of which is a needless source of pain and irregular evolution of the lesion. No point on the surface of the body offers such advantages as to site, as just at the insertion of the deltoid muscle of the left arm, and if a second insertion is made it should be two or two and one-half inches above and posteriorly over the edge of the same muscle.

If done on the leg probably the best site is on the inside of the knee over the inner condyle of the femur. Dr. Elisha Harris has said that the site of the insertion of the deltoid was so well established as preferable that legal responsibility might perhaps be maintained for ill results attending a vaccination elsewhere.

2 *Is it desirable to vaccinate in more than one place?* Experience shows that the duration of protection from smallpox, and from mortality of it, is greater in proportion to the number of good cicatrices of vaccination. The protection is measured in good degree by the quality of the vaccination as shown by the number, the size and the character of the scars. It appears that a person taking smallpox who has four vaccine scars has a probability of recovery fifty times greater than one who has not been vaccinated, and ten times greater than if he has but one (Marson). This proportion at the present time is not true in this state, for while one-fourth of the recently reported cases of smallpox were said to have been in some way or at some previous time (generally many years before) vaccinated, yet few, if any, of these cases have been fatal, though this we have not yet fully verified. But while the chief importance is the recentness of

vaccination, the quality of the vaccination shown by the number and character of the scars is important. Our reports are not explicit enough to contribute final data on this point; that discovered in the more exact observation in large hospitals for smallpox show it. We would say then that vaccination had better be done always in the two points, as indicated, for the protection is certainly enough greater to compensate for the somewhat increased soreness. Another reason is that there is greater certainty of securing that it takes.

3 *Cleanliness of the site of vaccination* should be secured. This may be done by applying a lather of clean soap for a few minutes, which may then be rubbed off with sterile cotton or a clean towel, or with the same the skin may be rubbed off with alcohol.

4 Of more importance is cleanliness of instruments and the hands of the operator. Using the glycerinated virus now to be preferred, sealed upon a sharpened ivory point, this point is in every way the best for making the abrasion; otherwise a new needle or one sterilized by heat. A tearing rather than a cutting instrument is best. With this the cuticle should be torn through in a rectangle of one-fourth of an inch area by cross-hatching so as to denude the papilla of the corium, to reach the absorbent tissue without drawing blood but tinged serum.

5 It is not necessary nor desirable to cut or tear deeply enough to open the capillary coops in the papillae of the derma. It is sufficient to remove the protective epithelium so that the lymph spaces between the prickle cells of the recto mucosum are reached; in doing this, however, even with a blunt instrument in some skins a few capillaries may be torn so that a tinge of blood will show, which is as much as should be done. The virus should be rubbed in with the flat side of the point for a minute, and the surface left exposed long enough to dry, nothing being allowed to ouch it or rub off the virus.

6 It subsequently needs nothing but protection both from soiling and friction. This can be secured by pinning a clean folded handkerchief over it to the sleeve. A good plan is to lay a bit of cotton over each abrasion and retain it with a strip of adhesive plaster, which can later be removed if with the subsequent swelling it proves a source of irritation, snipping off the loose cotton

if any has adhered. This is preferable to most of the shields that are offered.

There is practically universal belief in the medical profession in vaccination. Of the few who to-day oppose it the chief reasons given are that it does not protect from smallpox and that it is the means of introducing various diseases. A vast amount of unanswerable proof is at hand that it does protect, which the personal experience of every one who has to do with it verifies. As to the dangers of vaccination, which it is a highly reasonable question to raise, it can without question be said that none exist if virus free from any taint is used, if reasonable care is taken in using it, and then in keeping the abrasion and the resulting sore free from the introduction of external infection. The last is the chief source of evil, and can be avoided by covering the abrasion with perfectly clean substance so as to protect it from clothing or the handling of soiled fingers. Among the great number of death returns that come for filing to the State Department, four or five have been attributed to vaccination. These have been inquired into and traced with considerable certainty to needless infection of the vaccine sore with filth. Reasonable care in doing and proper cleanliness will practically prevent all ill results.

Dr. Lewis—The case which Dr. Curtis referred to of the physician who vaccinated himself on the shin suggested an instance which some of you may have seen in the Lancet during the past season, where a physician, under similar circumstances, in order to avoid a sore on his arm, selected a point directly over the sternum, and his experience was so gratifying that he reported the case to the Lancet. That site fulfills many of the requirements Dr. Curtis stated for the proper site of vaccination, and he further found it a most convenient place to vaccinate himself, and he said the friction of clothing and everything else was avoided. He congratulated himself over it. I am not saying that in order to recommend it.

A Delegate—I would like to ask Dr. Curtis whether it makes any difference whether your vaccine is six weeks old or eight weeks old. We had a lot of sore arms last year. This year we used vaccine about six weeks old, and on account of that we had hardly any sore arms.

Dr. Curtis—I should think a degree of attenuation of the irus might produce less soreness. We used to use, years ago, umanized virus, and it seems to me that we got a more uniform ffiliation in the process, greater regularity in its coming on, and n some degree better results. The Jennerian Society in London believe still exists, and it has preserved until to-day virus ransferred through sores of infants, humanized virus. Dr. Snow f Providence established a branch of that in this country, and ong ago we got some virus from Dr. Snow and used it. It ras exactly oval in shape, uniform in size, almost translucent ike dry resin, without pus, and it was all very satisfactory in its ppearance.

The bovine virus often, as Dr. Van suggests, seems to be violent n its action and irregular. Why it is I do not know. I cannot nswer his question as to the result of retaining it. It would e very likely to lose some of its force and possibly some of its fficacy.

A Delegate—I would like to ask Dr. Curtis (it is a question hat we often have asked us) whether the protection is a little reater, if in place of vaccinating in two places at the same ime, the vaccinations are a month apart?

Dr. Curtis—I don't know, doctor. I can not answer that. The nly trouble would be that in at least fifty per cent of the cases ou would get no result from the second time. It seems to me hat the person would be immune by the first vaccination. Some eople will take vaccination readily, again and again, and it was sserted at the last meeting of the Public Health Association hat vaccination would take very soon after recovery from small-ox. It is interesting to us to know that, because we have someimes used that as a sort of crucial test as to whether our diagnosis was right, but it was so stated by Dr. Hyde (who is xceedingly good authority) of Chicago, and it was agreed to by ome others at that meeting. But Dr. Bracken told me last ight that he had investigated that and found it not to be the ase, as to repeated vaccinations. The same thing would be true, lthough less likely to be. Perhaps Dr. Willis can tell us the esult.

Dr. Willis—I asked the question on that ground. I vaccinated a child twenty years ago with two vaccinations at the same time, and fifteen years afterward I revaccinated the same party and got a perfect looking vaccination. I have vaccinated two or three others twice, one month apart, in place of the two at the same time, and I have since vaccinated one or two of those persons, but I have not been enabled to make much of a sore. The vaccinations showed very slightly, a little aureola or redness, but, as one of the ladies told me, she didn't lose a meal or a night's sleep. If she hadn't known it was there and I had told her to be careful, because I wanted to watch the result, she would never have known that she had been vaccinated.

I would like to know the result from some other persons, if they have ever tried it.

Dr. Smith (of Palmyra)—I wish to state a case of a whole family which I vaccinated this fall. The father of the children objected to vaccination because he said he had so many sores on himself when he was vaccinated. I vaccinated four children, two boys and two girls, using a glycerated vaccine in tubes. I think it was prepared by Mulford. I prepared the arm by sterilizing the skin as far as possible, and sterilized my needle by heat, making one insertion at the deltoid. In all four of these cases they had very sore arms and eruptions in various parts of the body. The two girls in particular had large sores that nearly covered the lower lip. One of the girls in running fell and abrased her elbow and she had a sore that looked almost like a vaccination sore. One of the boys in wading in a little brook just by the rubbing of the grass against his legs, at every little point where it touched his skin was followed by a sore that looked like a typical vaccination mark. Where was the trouble—was it in the needle or in the virus?

Dr. Lewis—It certainly was not in the technique of the vaccination.

Dr. Phelps—I would like to ask the doctor one question. A physician is directed by the board of health to vaccinate the children of a public school where possibly there may be 200 or 300 children. Would you recommend or advise the vaccination of the children where the physician is satisfied, in his own mind, that there is scrofula, erysipelas, or eczema in the family of those children? That is something that I am very desirous of knowing, for the very reason that I had quite a good deal of trouble last winter, very much as the doctor has represented in his statement.

Dr. Hicks—I don't know that it is proper for us to diverge at all from the subject as it is before us at the present time; but during the last winter my experience in the matter of vaccinations was the superintending as it were as health officer of about 20,000 people, and I was in touch with all of the cases that were considered more or less serious. I would like to state that we had no cases in the city of Binghamton that were in any way so serious that it would convince me that only in exceptional cases should we decide not to vaccinate. I believe that when a person is exposed directly, or probably exposed, that the condition must be something very unusual that would decide us not to advise vaccination. We had some difficulty to enforce vaccination in our schools until we got smallpox that infected many of the children of our schools, but after that we succeeded in getting all of the school children vaccinated, excepting, I think, fifty-six. That is a good many, but they were in quite large families among the people who were stubborn, but they were kept away from the schools. I insisted that they should not be admitted under any circumstances to the schools while we were having our trouble with smallpox, unless they were vaccinated. Consequently we succeeded in securing the vaccination of the greater number—not as many as we would like, not as many as ought to have been vaccinated in Binghamton, but the results were such that no one in Binghamton can raise the hue and cry that vaccination is a dangerous procedure.

Now in regard to its protective power, and in regard to the contagiousness of the first stages of the disease, I wish to relate our experience, and then I would like to ask the health officers here, and Dr. Curtis which it is—either small-pox is not very contagious in its first stages or else vaccination is a very,

very effective procedure to prevent the disease, even after the time specified by speakers here last night in regard to vaccination.

Many of our cases, where we removed them to the hospital, we removed them during the fourth or fifth day of the disease: during the four or five days we removed them, all except one case. In every instance we fumigated the rooms and vaccinated the persons exposed. In no instance where we removed them by the fifth day did a case of smallpox develop in those that were exposed to this disease. In one case, we did not know of the smallpox case—it was not reported until the seventh day, as near as we could determine.

At that time it was discovered by a physician who was in the house vaccinating. There were in this house five children. This physician was called to vaccinate four of them. He vaccinated three out of the four, and when about to vaccinate the fourth, discovered that the fourth had smallpox, and he ran out of the house just as fast as he could. I asked him in regard to the people that were on the premises—I asked him the names of the persons and who they were, and he said there was one man. I said, "Did the man run?" Often they do. He said, "The only man I saw run was myself."

Now the result was this: Remember this—he had vaccinated three, one was sick with smallpox, and the fifth came home at night from the shop where he was at work. It was near the hospital. He carried his brother to the hospital.

Now we depended upon the vaccination of this physician who ran, but we vaccinated the other boy that had not been vaccinated at all; and now, remember, that this boy that we vaccinated did not take the disease, but the three other children, the two sisters and brother that were vaccinated by the other physician (it was not successful and did not work)—all three of them had the smallpox.

Now, our experience is such that I can not determine whether it is the protection of vaccination or the lack of contagiousness of the first stages of smallpox.

Dr. Wey—Mr. Chairman, I desire to corroborate what Dr. Curtis has said in regard to more defined influences of the humanized than you see at the present time in the bovine. With reference to the virus brought into this country by Dr. Edwin Snow of Providence, and afterwards propagated by Dr. Lefferts who was the successor of Dr. Snow in the public service some years ago, I was using very extensively this vaccine virus, obtaining from Dr. Lefferts and using between five and six hundred points every year extending through a number of years. In my experience I did not have a septic case; I did not have a case of aggravation of the symptoms, and it seemed to me the sequel which followed the ordinary manifestations were more typical than what it is from bovine virus. But there seems to have been within the past years a dislike of the humanized virus gone abroad through the community, so that, so far as I know, there is very little if any used at the present time. There was a case last summer in which the mother contracted the disease from a child, though the diagnosis of the child originally made was one of measles. This mother presented upon her arm a scar one inch and a half in diameter, which to my mind was nothing more or less than a septic sore and absolutely no immunity was conferred by it. I think at the present time there is a large amount of spurious vaccination, and a large number of children attending schools bearing certificates of vaccination which are hardly worth the paper upon which they are written. Now, perhaps, my technique—yet I followed out pretty nearly as Dr. Curtis has described this afternoon—is at fault, but my trouble for the last year has been to get any success at all, and I would like to know if there are others who have had similar experience—time after time, trial after trial, without any success, that has sometimes mortified me beyond expression.

A Delegate—I would like to say here—the doctor has asked this question—I vaccinated two hundred with only two results.

Dr. Bogart—Within the last year I vaccinated one hundred and five children in an institution with virus from the New York city board of health, with the result with one hundred and three I got good results; the one hundred and fourth one was found afterwards on the other arm to have been successfully vaccinated; the one hundred and fifth one we found had been vaccinated at least five times previously from the small scars we found. We vaccinated her three times with no success at all. Why my success has been better than others—I have had samples from Pennsylvania, Boston and other portions of the country with very few if any successes—I don't know, but in my experience, I have come to the conclusion that in the propagation of bovine vaccine virus about nine-tenths of the so-called virus—I mean nine-tenths of that which is put upon the quill—is not virus. In taking the vaccine virus from the animal, after a little time the virus ceases to flow, there is none there, and if you scarify further you get serum, not virus, which may be the cause of its not taking well.

In answer to another question here, which the doctor could give no solution of, the reason why the bovine virus is more harsh in taking, it seems to me it is probably because it is mixed very extensively with the serum of the calf, while with the humanized virus if properly taken, that is the little cell or whatever you may call it, surrounding the crust there are multitudes of little cells, each cell containing one little drop of virus. It is pure, no contamination, no blood in it — I would be perfectly willing myself to be vaccinated with that taken from a scarlet fever patient, because I believe there is no contamination in it at all. In some way the crust on children, before they get to maturity, break off; if there is no breaking of the valves meantime you have pure virus and nothing else, while with the bovine the surrounding tissue is injured and you get serum where you want virus. I had twelve years' experience practicing in the Eastern Dispensary of New York, and the best virus I ever received, which gave the best results with the least constitutional disturbances and a beautiful mark, was that of a case of cowpox taken directly from the teats of a cow where it was found by accident. A girl called on me and I found a sore in the middle of her hand. It was typical vaccination. She was a milkmaid, and I asked her if any of the cows' teats were sore and she said yes. I examined and found cowpox there. I got a portion of it in capillary tubes and used it myself locally and in New York with the best results. The results were far different, everything was more marked, the resulting sore or scab was perfect and when it came off you had the most typical vaccination mark I ever saw.

A Delegate—I would like to ask, Mr. Chairman, what we are to do in regard to the vaccination of children. The law says they must be vaccinated before they go to school, and yet if you do you may break up a school that has been going on. What are we to do in that case?

The Chairman—If you don't vaccinate them, then smallpox will break up the school.

A Delegate—With the vaccine I used to get from the department of New York city I have never had any trouble, but when I first began to practice medicine — which was quite a little while ago — I used humanized virus, and it worked a great deal better than anything I have seen since and we didn't have bad arms. I corresponded with the Board of Regents here and the Department of Public Instruction as to what to do with regard to the vaccination of school children. Well, they said, do the best you can, and that is what I did, I let it go.

The Chairman — I have answered several communications on that subject within the last year. You cannot vaccinate a man against his will absolutely. You may, of course, with the aid of the board of education exclude the children from school until they are vaccinated, but I have made the suggestion that where you have a family that will not allow the health officer to vaccinate, that you may by a little diplomacy with the family physician secure the vaccination of these children. There is almost always a way in which the vaccination of the family can be secured. I do not recollect now — and I have practiced for a good many years — I do not recollect anybody I ever found whom I did not persuade to be vaccinated, with one exception, and this was last winter, where a whole household was quarantined at Garrisons and a man preferred to stay there until the quarantine was raised, although I was willing to let him out if he would be vaccinated. He stayed there and did not contract smallpox. But you can usually get the consent.

Tuberculous Patient. Where and to what extent shall his liberty be limited?"

Dr. Edward R. Baldwin, of Saranac Lake, N. Y., then read the following paper on

"THE TUBERCULOUS PATIENT, WHEN AND TO WHAT EXTENT SHALL HIS LIBERTY BE LIMITED?"

Like many other questions in medicine affecting the public health this has its theoretical and scientific, as well as its practical aspect. For the purposes of this discussion we may practically limit ourselves to the consideration of the tuberculous individual who coughs and expectorates tubercle bacilli. The other forms of tuberculosis, such as genito-urinary and intestinal, may obviously be disregarded so far as the public danger is concerned, both on account of infrequency and the nature of the excretions. Likewise the bedridden consumptive is not likely to affect any but his immediate associates, so that we may narrow the question to the patients who are able to go about.

As we all know, the possibility of infection by inhalation of dried pulverized sputum, or of moist sputum in spray, has been experimentally demonstrated. Besides spitting directly upon the floor, tuberculous patients may in coughing involuntarily expel small particles of sputum containing bacilli, but it is principally in hard, expulsive coughing, where the sputum is abundant and lacking in its usual tenacity that this occurs. Heavier particles there may be, or fine spray of saliva with occasional admixture of bacilli which may float about and be inhaled directly by other persons in the near vicinity, especially in a closed room. On the other hand, it has been shown that dried pulverized sputum loses its infectiousness within a day or two when exposed to the light and air, while the bacilli conveyed in fine droplets of spray by expulsive coughing presumably lose their vitality much sooner, because, being very minute, they dry more rapidly. Experiment has shown this to be true of other bacteria under similar conditions. It has also been found that these fine droplets are carried about three feet by the act of coughing, but may be conveyed further by the currents of air. Ample demonstration has been made that bacteria can be inhaled into the smallest bronchi either in dust or spray; but, on the other hand, the defensive mechanism is so perfect that very few can be detected in the lungs after a few hours; and the normal lung, so constantly exposed to germ-laden air, is practically aseptic when examined immediately after sudden death during good health.

More evidence has recently been brought forward that tubercle bacilli can be absorbed from the intestine with the chyle, and be found in the thoracic duct soon after ingestion, without any lesion of the intestine, yet this occurred under special experimental conditions when enormous quantities of bacilli were used, and it is therefore difficult to judge how important infection in this manner is, by swallowing—may be under natural conditions.

To recapitulate then, the possibility of danger from the presence of a consumptive, in the order of its importance as viewed at present, is—

First. The direct inhalation of moist, fine droplets, or indirectly from the dried sputum contained in handkerchiefs, clothing, or in the dust of a room.

Second. The ingestion of the infection together with food contaminated by sputum or other excretions.

It is agreed by all authorities that the danger of out-of-door infection may practically be neglected, owing to the great air dilution. Let us next consider how great the danger really is to the public from such an individual. The majority of tuberculous patients in condition to walk about and engage in their occupations raise the expectorations for the most part in the early morning—at least that portion containing the bacilli in largest number. When he mingles with others during the day time he may expel, under the conditions above mentioned, minute droplets carrying virulent bacilli, or may scatter the dried bacilli from his moustache, handkerchief, or clothing, or, by gross disregard of decency, actually spit on the floor. He may also infect objects which he handles with his fingers soiled with sputum.

The question now arises, to how many persons and to what extent is this patient a source of danger, assuming for the moment that he frequently coughs in the faces of others within a distance of three feet? I believe the chance of conveying virulent bacilli directly to be relatively slight, except in prolonged close contact. We know they lose virulence rapidly in drying; we know also that nearly everyone must repeatedly inhale this dried infection, but the chances of serious results, judging from clinical experience, must be few. Either the majority of the human race in ordinary health has relative immunity to the tubercle bacilli, or the tuberculous infection in most cases is received in a condition of low virulence or in small numbers. The great number of healed tuberculous foci must be interpreted in one or the other way.

Now let us consider for a moment how enormously decreased must be the danger when this consumptive takes a few simple precautions; namely, covering his mouth with a handkerchief, or with his hand or, better, with a piece of cloth during expulsive coughing, and always depositing the expectoration in a suitable receptacle. In the first place, the danger from fine spray is practically eliminated, for even should he not cover his mouth when in the privacy of his own room, the dried infection has unquestionably low virulence as compared with the moist, and by using a cuspidor, or cloths, which are promptly burned and carefully handled, the danger is in all probability reduced to minute proportions. The weight of experience in institutions and resorts the world over is fully confirmatory of this opinion.

In taking this view I am not unmindful of the fact that there are periods of susceptibility in nearly all persons; for example, during acute diseases, like measles, diphtheria, or influenza; nor of the practical difficulties in the way of securing adequate protection, particularly among the members of the family of the patient in crowded quarters. Even in such instances it seems to me that among intelligent people of the present day, often the greatest danger occurs before the disease is recognized and any precautions are taken. In short, the damage, if any, has already been done before the nature of the malady becomes apparent. Likewise, to the general public, the greatest difficulty for the health officers is to discover the disease before harm can be done. Practically most cases of open tuberculosis progress from six months to a year before being recognized; hence the futility of quarantine or other stringent regulations in this disease at present. It may be argued that fewer persons who have expectoration with bacilli go unrecognized at the present time, but I still maintain that the experience of health resort physicians fully bears out the statement above made.

Even should all cases be recognized as soon as the expectoration develops, I cannot believe that strict isolation is necessary, except among the most depraved and ignorant. Then, too, it is already evident that the leper idea is bearing fruit in the concealment of the disease by the patient, his family, and his physician, in order to prevent loss of a position in business such as a hotel or bank, or even a school. Granted that the ideal to be hoped for is the sanatorium treatment and education of all tuberculous persons, whether of high or low degree; until the state is prepared to provide open-air occupation and support for the tuberculous patient and his family, should that be at all practicable (which is very doubtful), much more is likely to be accomplished by popular education. The training of school children in the higher grades in the hygiene of coughing, along with instructions in temperance physiology, ought to produce a marked diminution in the disease during a generation. Meanwhile the question of restricting the liberty of a tuberculous patient can be decided according to the circumstances in each individual case. I certainly think that it is the duty of the public health authorities to discover as many cases of tuberculosis as possible by registration, and endeavor to control the vicious ones and instruct the ignorant without publicity or undue alarm to themselves or their friends. Where it can be shown that the patient is not engaged in an occupation where special opportunities of spreading the infection are present, as in a crowded factory or school room, I do not think that health boards are at present justified in prohibiting the patient from pursuing his avocation, provided he takes the simple precautions mentioned. Even in instances where the means of livelihood are removed from the patient, there should be sanatorium treatment, and other occupations provided. It is certainly true that nearly all open-air occupations involve little or no danger to the public health, but in the present state of unreasonable fear with which the public and many physicians are seized, a consumptive postman, or a butcher's or a grocer's delivery clerk will be boycotted as ruthlessly as the poor seamstress, clerk, or school teacher.

Gentlemen—I believe it is time to pause and remind the public, and that part of the profession who are lending their aid in the unfeeling campaign against the poor consumptive, that the millenium has not arrived yet; that complete protection cannot be obtained in the present state of society; and that frequently they are straining at a poor little gnat of fancied danger while swallowing, or inhaling a large camel of infection, which they cannot avoid, try as they will. Let us have reasonable laws, abreast of the intelligence of the people; let us register and disinfect, and above all, educate, but let us be humane and extremely careful how far we limit or restrict the liberty of consumptives who are decent.

The Chairman—The paper of Dr. Baldwin is now before you for discussion.

Are we to understand, Dr. Baldwin, that you would permit a school teacher to continue her work in the school room if she was a consumptive?

Dr. Baldwin—Mr. Chairman, I think I made that one of the exceptions. I should hardly feel like having my child attend school in a school where the teacher was constantly expectorating tuberculosis bacilli. Still it is a question whether in every instance it could be so decided.

The Chairman—We are sometimes asked that specific question.

A Delegate—I would like to ask the Doctor if I understood him to say he considered the sputum lost its virulence or contagious properties within a day or two? The workingmen in our city are to a large extent workers in cutting glass. In fact

I think we have the largest establishment of that kind in the United States. I have been examining the establishments a little trying to ascertain why it is we have so much tuberculosis among young men. I find in one instance from the same bench I have four consecutive cases of tuberculosis which rapidly proved fatal, none of them, however, showing symptoms until several weeks — in one instance six months — after he took his place at that particular bench. Now almost without exception every case of tuberculosis from the factory are from benches which the men have become educated to classing as dangerous benches, I had supposed until I heard the Doctor that these particular places, these benches had become infected and I was going to endeavor to obtain cultures there and disinfect them. But if it dies in a day or two that would be doing a lot of work for nothing. Now in our blowing room we find the trouble with men who work at certain benches there. Of course it is moist as well as dry. I would like to know about this.

Dr. Baldwin—Pardon me, I think I said dried, pulverized sputum would lose its virulence in two or three days when freely exposed to air and light. In the instance which you mention one would have to know all the circumstances — whether the man coughed into their faces, whether there were large crusts of sputum which they may have in some way swallowed or may be inhaled. In large masses, these large crusts of sputum, these retain living bacilli for a month and over and are quite apt to be inhaled. Experiments show that the bacilli will live in a dark room from a month to two hundred days by being deposited in a dark corner and not pulverized; it may retain its virulence even in a dried form to some extent though it is very much diminished.

A Member—I can explain the situation here more definitely. The desks are placed like these with just room enough between them to permit a man to pass safely, with the best light it is possible to obtain, they have electric lights so that they have good light to work by. A man at this frame has been working there for years, has been relieved by others and others, and there has been no tuberculosis; while a man working at this, which is known as a dangerous frame, after working six or eight months is attacked by the disease; he is succeeded by another and another, we had four at this one particular frame. They handled the same instruments, but that is all, and worked at the same frame. It seemed to me it was possible the frame was infected with the stuff.

Dr. Baldwin—I would like to say in answering again that there are a great many mysterious cases which as health resort physicians we attempt to trace, but unless the infection is in the immediate family we are very rarely able to trace the source of the infection. That is to say, we may take the ground that they accidentally inhaled the germs under especially bad conditions; that is one mode of infection. Or we may take the ground they were constantly exposed, without anyone having known there was such exposure; in other words, you may have had a tuberculosis person in the factory who is not known to you, not known to any of the others, who is in fairly good health, may expectorate very little and yet be a source of infection. It is very difficult to trace all cases of tuberculosis.

Dr. Bryce—I recall that one of the physicians who was, I think, stationed at Saranac Lake for a time made some experiments with dust there. I was going to ask the Doctor if he remembers the circumstances and whether it was not the fact that the dust gathered in the sanitarium did not produce any very considerable number of cases in the rabies inoculated for tuberculosis? If it was in any degree proportionate to the number inoculated it would seem to indicate that it is dangerous under circumstances which the Doctor has not fully explained. I would like to ask the Doctor if that is so?

Dr. Baldwin—I did not expect when I came here to go into the minutiæ of the experimental side of this question. The cultivation of tuberculosis has received a great deal of attention during the last three years in the laboratory. Prof. Freeber, of Breslau, has been studying these matters. The matter which Dr. Bryce has just mentioned is of great interest because we have always depended upon the experiments of Cornil which have been quoted so many times, as to the infectious nature of dust. There has been a doubt cast on the cy of his conclusions by the work of Freeber. They the experiments which have been hitherto made of dust, ed dust, have not in reality been made with dust but large masses of sputum; that in scraping walls and ing carpets the experimentor gathered large particles of n, relatively large particles—that is, they did not get pul- l dust. Pulverized dust which is capable of being an- contains relatively few bacilli and they must be in a lried form. We know experimentally that dust in that when it is thoroughly dried, loses its virulence, or rather rms do. That has been shown by Prof. Freeber. It was by Cornil after repeated experiments he could infect animals, as he said, by pulverized dust, sweeping a carpet ample, and permitting guinea pigs to run about at the time and making them inhale this dust, but in that in- there was undoubtedly sputum which had simply dried carpet, and undoubtedly the conditions were not exactly)btained in a living room under conditions where the dust en pulverized after slightly drying and after having been carpet has been walked on by people in the room—per- ias been several weeks in the course of this pulverization ying. In such instances the virulence of the bacilli from esent standpoint must be very low, and emphasis has been ally changed from the pulverized dust infection to the spray infection and the swallowing infection. The case llowing infection has as yet not been fully decided, and these instances of reported dust infection we have yet to all the facts.

Yates—It certainly goes without saying that this is a subject at the present time, and I would like to ask Dr. in if there is any virulence in the dust that is blown our streets in a city like this for instance.

Baldwin—I think I mentioned that matter in the course paper, that authorities are practically agreed the dust streets lacks virulence in the way of carrying tuberculosis ion; that is there is very little danger of tuberculosis infection in fine street dust. In all the experiments that have been made with street dust, it has been found the bacilli lost their virulence very rapidly on drying in the sunlight.

Dr. Yates—I misunderstood you.

The Chairman—Any further discussion? I would like to mention what I mentioned before, that I hope to see as many of you as possible at the laboratory, where Dr. Pease will be ready to welcome us at any time after eight o'clock.

If there is no further discussion, I desire, in behalf of those of us who are engaged in the work of the State Department, to thank you for your attendance and the gratifying evidence which you have displayed of your interest in the subjects here discussed. I can only repeat of this convention what I said of the last one at the opening of this — that we now know that these conferences are a success from every point of view; a success in promoting a higher degree of efficiency in health work throughout the state; a success in encouraging those of the department in labors which are often arduous for the benefit of the public, and in a social way extremely pleasant to all of us. It is a pleasure which we cannot fully express to be able to meet so many of the sanitary officers of the state and talk these matters over, and I wish to thank you, gentlemen for your attendance. (Applause.)

Dr. Hix—Mr. Chairman, I know we all feel very grateful to you for your efforts in this behalf. It is entirely due to the Commissioner of Health that these relations are brought about. Last year we had a meeting here and I was here. Now I see that there are many new faces here. This meeting has been much more interesting than the meeting last year although that was very profitable. Some expected that the interest in these meetings would soon wear out. Now I feel for one that the interest will increase. I really think that we could have another day and have as interesting papers as we have had and as interesting discussions. We have all benefited by our coming here and let us give the Commissioner a vote of thanks for his excellent work in behalf of this conference. I believe it is very appropriate for us in some manner to thank him for his efforts in this behalf. Now I would move that we give him a rising vote of thanks.

Motion seconded by several.

Dr. Hix—I know we all appreciate very much the visit of these health officials from other municipalities and other territories. I know it has added much to the interest of the meeting to hear from these illustrious gentlemen.

Now, gentlemen, all of you who are in favor of giving a rising vote of thanks to our Commissioner please arise.

(All present arose.)

It is carried, Mr. Commissioner.

The Chairman—I thank you, gentlemen, I thank you heartily for your kind expression. The meeting is now adjourned.

ANCER LABORATORY

REPORT OF THE DIRECTOR.

BUFFALO, N. Y., *February* 1, 1903

R. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Sir—I have the honor herewith to transmit my own report as ecutive head of the State cancer laboratory, and those of my lleagues, pertaining to the work done there during the past ar. The staff of the Laboratory at present consists of the folwing:

Dr. Harvey R. Gaylord	Pathologist.
Dr. H. G. Matzinger	Bacteriologist.
Dr. G. H. A. Clowes	Chemist.
Prof. Gary N. Calkins	Consulting Biologist.
Alice G. Owen	Assistant.
F. S. Low	Assistant in Photo-chemistry.
E. W. Jeffcott	Assistant Chemist.
Clara A. Maclay	Secretary.
F. A. Payne	Janitor.
Fred Tepe	Laborer.
M. Weber	Laborer.

Expenses of Conducting the Laboratory for the Period *February* 1, 1901, *to September* 30, 1902.

1901	Equipment	Stock and material	Sundry expense	Salaries	To
February	$241 35	$56 04	$64 95	$806 66	$1,1
March	33 80	73 86	39 13	786 66	9
April	105 55	77 70	96 67	861 66	1,1
May	48 50	72 77	104 58	841 66	1,0
June	....	....	....	841 66	8
July	84.10	118 21	59 42	528 32	7
August	7 16	26 71	62 81	333 33	4
September	....	....	....	333 33	33
October	53 25	39 57	18 53	1,141 33	1,25
November	1 68	24 51	23 50	736 66	78
December	46 34	31 73	190 27	676 66	94
1902.					
January	2 06	19 41	84 23	676 66	782
February	....	16 21	203 07	736 66	955
March	333 42	76 29	119 89	746 66	1,276
April	80 36	240 20	126 31	878 36	1,325
May	103 55	60 63	213 29	869 99	1,247
June	90 93	83 68	131 45	869 99	1,176
July	488 51	59 54	132 75	786 66	1,467
August	3 35	27 35	272 82	786 66	1,090
September	165 76	245 12	248 82	553 33	1,213
	$1,889 67	$1,349 53	$2,192 49	$14,792 90	$20,224

It will be noticed that this period covers twenty months, that the entire expense for this time has been $20,224.59.

The bills for each month are audited separately by myself, sent to you for your revision, and then go to the governor for signature before the comptroller remits the amount required.

The deaths from cancer in New York state for the year en December 1, 1902, as taken from the bulletin of the State Dep ment of Health, have numbered 4984. Taken by months statement is as follows:

Deaths from Cancer in New York State Year Ending Dece 1, 1902

December, 1901 ....
January, 1902 ....
February, 1902 ....
March, 1902 ....

1902	439
1902	501
1902	411
1902	434
t, 1902	443
nber, 1902	314
r, 1902	416
ber, 1902	419
	4984

reports of Drs. Gaylord, Calkins, Clowes, Matzinger and
herewith transmitted, will be an excellent indication of the
ter and the amount of work done under State auspices in
stitution. A very brief outline of the general character of
rk may not be amiss, and would be as follows: During the
onths work has been done upon the yeasts, which we for a
ime suspected to be actual parasites of cancer, until the
t was fairly exhausted and these suspicions considered to
founded.

work was done with various cultures of yeast and with
s, and was followed out until it appeared that yeasts were
ncerned, at least in the production of cancer. Since then
ion has been given mainly to the protozoa, which are now
bjects of a very extended and searching inquiry. This is
ularly true of the Plasmodiophoræ. These are known to
e tumor formation in plants, and there is constantly in-
ng evidence that they or some allied protozoan forms are
ned in the production of cancer. Dr. Matzinger, who has
ade a separate report, has coöperated with Drs. Gaylord
lowes in working with this organism. A very suggestive
by Professor Calkins is also included.

work at present is conducted along three principal lines
three laboratories—the pathological, the chemical, and the
iological—using this last term in its broader sense and
ng thereby that bacteriological methods are being applied,

so far as they are applicable, to the study of other minute forms of life. That this work may go on to best advantage there must be the heartiest coöperation between these various departments, while methods and results are so dovetailed, so to speak, that it is impossible to say that the head of one department can concern himself with one solitary phase of the subject. I am glad to be able to say that this correlation of the work goes on here in the best of spirit and with the happiest of results, and that it seems to be leading up to discoveries of value and the establishment of facts of the greatest importance.

In a general way I may say that the principal work now carried on in the chemical laboratory relates to metabolism in its broadest possible sense—from that in the individual cell to that in the body at large—with a view of discovering if possible the nature of the perverted metabolism now so generally recognized in connection with cancerous disease. So much, however, has to be established more definitely regarding these changes under normal conditions before we attempt to estimate the abnormal that the work necessarily makes slow progress. In fact it is true of all the work done in this Laboratory that we have had to deal with such novel or hitherto unsolved problems on every hand that it has taken a great deal of time to be able to approach them with any definite amount of fundamental knowledge.

This is particularly true with regard to the protozoa. There is not a practicing physician in the United States who has anything more than a rudimentary knowledge of this subject, and yet the question of cancer has become more and more a biological problem. Being thus confronted with questions of the greatest medical interest which yet could not be at present solved by medical men as such, we have added to our corps, with your approbation, Prof. Gary N. Calkins of Columbia college, who joins us as consulting biologist. He is certainly the best qualified authority on the subjects which here most interest us to be found in this country, and we look for large benefit to accrue from his advice and experience.

The publication in our last annual report, and elsewhere, of Dr. Gaylord's researches aroused, as was to be expected, considerable criticism from various directions, most of all from those least conversant with the subject. Dr. Gaylord spent some weeks last fall in Europe (without extra expense to the Laboratory) in comparing results with those of the most eminent European workers in this direction. While each reader of his present report will gather therefrom that the statements previously made have to be but little, if at all, altered to accord with the present state of our progress, it is with pleasure that I assure you that from various sources, public and private, I find that the sentiment is everywhere growing that this work is conducted on proper lines, and that its results as already published constitute a very distinct advance and give very great promise. Were this the place in which to become controversial one might easily go into an animated discussion and point out the baseless character of most of the criticisms which have been directed at it. I feel, however, that it is at least due to all concerned to say that the views enunciated in our previous reports have become more and more widely accepted and corroborated.

An important part of our work is also the critical study and condensation of the special literature bearing upon it. We are gathering a library of such literature as fast as our means will permit, and we endeavor to let nothing of importance in the world's literature pass unnoticed. You will readily see that in this effort alone not a little time has to be expended.

A very important part of our work during the past year has been the effort to determine something of the real value of the Roentgen or X-rays in the treatment of cancer. Generous friends of the Laboratory have contributed an exceedingly elaborate outfit for this purpose which has been set up in the Buffalo General hospital, and is in almost constant use there. To this feature of the subject I have mainly devoted myself. I feel that this is hardly the time or place in which to write an elaborate paper on this subject. The medical journals of late have been full of such papers and the topic has quite lost its novelty, but what has been needed in my estimation is a prolonged study based on a large number of cases and watched for a sufficient length of time in order that one's judgment may be ripened and his expressions on the subject thereby made of value. Recently a large Finsen light apparatus has been added to our hospital equipment, and I am now experimenting with a more portable apparatus for applying the ultra-violet rays for this same purpose. With this I have as yet had too little experience to justify any statement whatever, although the reports which come to us of its use abroad are mostly favorable; but with regard to the X-rays, I am quite prepared to say that in certain cases and within certain limits they offer the most helpful means for relief of pain and favorably influencing or retarding malignant growths that we at present are familiar with.

I do not mean by this to report to you that X-rays will certainly cure any kind of cancer, but I am willing to go so far as to say that certain varieties of superficial cancer have been apparently cured, and that in many instances remarkable relief has been afforded and remarkable changes witnessed. A spirit of conservatism, which I am sure you will consider wise, should prevent any more optimistic statement than this at present. It is proposed to continue these clinical investigations, upon which a more detailed report may be expected later.

The needs of our Laboratory for the ensuing fiscal year are not essentially different than those of the past. We certainly need every person now connected with the staff in order that the work may go on, and the expenses bid fair to be about the same as before. I would like to renew the statements previously made—that the state is saved all expense in this investigation save the actual outlay of its conduct, since the University of Buffalo, through the generosity of Mrs. Gratwick and of other friends, has provided the building and most of the equipment. Consequently there is no rent to be paid.

It is an important part of our work that we should feel at liberty to employ special talent for any special line of investigation which may seem to promise an adequate return. I do not feel therefore that it would be just to ourselves and the importance of the work we are doing to ask for anything less than

$15,000 for the ensuing year; i. e., the same amount which we have had previously at our command.

In conclusion I want to express our appreciation of the uniform courtesy and sympathy with which our efforts have been received by yourself and by those in authority. From myself and from my colleagues in the Laboratory I have had always the kindest assistance and the heartiest coöperation, and I am glad at this time and in this place to record that fact and to express my grateful appreciation thereof.

ROSWELL PARK.

February 1, 1903.

On the Present Status of the Investigation Into the Etiology of Cancer by the Cancer Laboratory of the New York State Department of Health, University of Buffalo.

By Harvey R. Gaylord, M. D.

In the third annual report from this Laboratory the writer published a series of experimental investigations and observations which led to the conclusion that there was strong evidence of the presence of an organism in caricinomatous material. The first reference made to experiments which indicated the presence of an organism was in January, 1899, before the Medical society of the state of New York in Albany. The suspected organisms were first observed in peritoneal fluid, where they appeared as hyaline, pale yellowish-green bodies, varying in size from slightly larger than a micrococcus to a size nearly as large as a red blood corpuscle. The smaller forms of these bodies were without structure. In the larger the suggestion of a nucleus was present. The observer incubated an uncontaminated preparation and observed the same field at repeated intervals for a period of four weeks. During this period certain of the smaller forms which were definitely located were observed to increase in size, ultimately develop what appeared to be a capsule, and terminate by dividing into numbers of small, hyaline bodies, closely resembling the original appearance. A portion of the peritoneal fluid thus obtained was injected into guinea pigs. One of these, after a short period, was killed and multiple nodules which, on microscopic examination, appeared to be rapidly growing adenomata or adenocarcinomata, were found in the lungs. Attempts to stain the hyaline bodies were unsuccessful until a method of pouring the peritoneal fluid into Hermann's fluid was employed, when it as found that they could be stained with a nuclear stain (iron ematoxylin). These bodies were treated with osmic acid and large proportion of them were found to resist the blackening of mic. Peritoneal fluid, cancer mush, dried and undried lymph odes, were injected into animals and large numbers of similar aline bodies were detected in the peritoneal fluid of the animals, the circulation and in hardened sections of the enlarged lymph odes. From the suggestion obtained by the appearance of aline bodies in the blood of inoculated animals the observer xamined the blood in living cachetic cancer patients and detected e presence of small, actively moving amœboid bodies, which ere compared with those observed by Pfeiffer and Reed in vacine and variola, and which, the writer was inclined to believe, epresented an amœboid form of the organism found in peritoneal uid and cancer scrapings in man. A comparison was drawn etween the appearance of the hyaline bodies and those described n vaccine and the pustules of variola. An investigation of a umber of cases of cancer showed the presence within the cells f what are often referred to as "Plimmer's bodies," which have een most accurately described by that author. These bodies ere found to be present in a large proportion of all cases investigated. A relation between these bodies and the extra-cellular, yaline forms found in carcinoma, known as "Russell's bodies," as indicated, as well as the similarity in appearance of the so-alled "Plimmer's bodies" and the so-called "vaccine body" btained by inoculation of the cornea with vaccine. Intra-ellular, hyaline forms somewhat resembling the so-called "Rusell body," and likewise resembling certain forms of the vaccine ody, were also shown. The supposed resemblance of the so-alled "Plimmer's bodies" to yeasts was considered and rejected. number of animals inoculated with cancerous material died, fter a period of time approximating fifty days, with marked achexia and with enlarged lymph nodes. In the lymph nodes f these animals hyaline forms closely resembling those found in he fresh cancerous material were observed. The development of he cachexia in these animals was compared by the writer to the erminal process of cancer in man.

Our views regarding the possibility of an extra-cellular form of a parasite in cancer have been repeatedly misinterpreted by writers reviewing our statements. It has been stated that our observations must of necessity be incorrect, inasmuch as the nature of the cancerous process is supposed to preclude the possibility of a parasite being present except in some symbiotic relation to the cancerous epithelium. It has at no time been our belief that, if the amœboid bodies described by us represented a phase of the cancer parasite, in this phase the organism could be capable of producing reinfection. From what is known of protozoa, especially what is known of Plasmodiophora Brassicæ in the plant, it is possible for an organism to be capable of infection of specific elements of the economy in one stage of its cycle only, and having passed into a second phase become incapable of reinfection without the interposition of an ectogenous cycle, in most cases in an intermediary host. In this connection a foot-note which we added to our article as it appeared in the report to the legislature, submitted April 15, 1901, will express our point of view at that time:

> As the editorial comment upon the above paragraph, as it appeared in the *American Journal of the Medical Sciences*, shows evident misinterpretation of the writer's meaning, he has deemed it advisable to give the wording a more specific character. He has carefully avoided any theoretical deductions and has merely recorded observations as they were made in the Laboratory, with the intention of describing all of the experiments in detail in future publications. One evident misinterpretation credits the writer with the belief that cancer is a general and not a local disease. He trusts that those who will reread that portion of the article as it appeared in the *American Journal* will see that no deduction of this sort is warrantable. Cancer unquestionably begins as a local infection of the epithelium and at some stage of the disease, yet undetermined, the organisms apparently find their way into the general circulation, and, as stated above, after death can be found in all the organs of the cadaver. The exact role which the organisms play when in the peripheral blood is naturally undetermined. It is even fair to assume, from what is known of similar organisms, that they are entirely passive. A number of the protozoa which infect the blood of the lower animals produce very slight disturbance, and it is highly probable that the significance in this case is of no greater importance than showing the general distribution of the parasites in the later stages of the disease. It is our belief that the termination of fatal cancer cases bears some relation to the general distribution of the organisms, but we have carefully avoided all speculation as to the significance of the above observations.

Since the publication of our article in the May number of the *American Journal* and in the form of the Third Annual Report of this Laboratory a series of investigations relating to the amœboid form of the blood platelet have appeared, which throw much new light upon the subject of amœboid bodies in the blood of human beings and animals. For this reason it is desirable for us to review the evidence as it stands.

The bodies which we observed were first found in peritoneal fluid in a case of cancer. The description, as given in our previous article, is as follows: "A careful microscopic examination was likewise made of the peritoneal fluid. It was found to contain a few blood corpuscles and some pale, spherical bodies, in size varying from two to ten micromillimeters. They were homogeneous, of a pale, yellowish-green color, and at first were mistaken for fat droplets, although on closer examination their refractive index was seen to be too low.

" When treated with osmic acid they failed to give the black reaction which characterizes fat. Attempts to stain them were partly successful, and it was found that with cover slips fixed by heat, although the bodies were greatly deformed by the process, a certain number of them could be stained with carbol-thionin or the usual aniline dyes. Some of these bodies, though not very numerous, contained granular material which showed marked Brownian movement. The tubes were examined from day to day and we were able to demonstrate that these spherical bodies gradually increased in size, became more indefinite, gradually lost their yellowish-green color. As they increased in size they apparently became more fluid and commonly sent out pseudopods and long projections. Fine, colorless granules appeared in the protoplasm, and in some a delicate nucleus could be made out."

An examination was then made of a number of cases of carcinoma in the last stages, with the result that similar bodies were detected.

" In one case of general carcinosis small amœboid bodies were found in the blood immediately after it was withdrawn from the patient. These conformed very closely in appearance to similar bodies described by Pfeiffer and Reed in the blood of vaccinated fixation with osmic acid vapor and staining with hæmatoxylin, the central portions of these bodies stain more deeply than the periphery. The deeply staining portion at the center is interpreted by Deetjen as a nucleus, and he concludes that the blood plates are therefore definite elements which, under certain conditions, are capable of taking on an amœboid phase.

After first describing the usual degeneration phenomena which blood platelets undergo in blood after withdrawal from the body, he describes the behavior of these elements when placed upon agar films impregnated with the salts above mentioned. In the course of five minutes, in most cases somewhat sooner, or in others later, the blood platelets are found to undergo certain changes. The platelets are first seen in the usual form of round or oval plates and are usually present in considerable numbers. In this stage they are apparently in a state of rest comparable to the spherical form taken on by the leucocyte in the stage of contraction. From this form they gradually become larger and two different substances can be detected within them; a central, highly refractive portion, usually round and of greenish color, and an outer, paler protoplasm. The outer protoplasm immediately sends out pseudopodia. These are projected with great rapidity from various portions of the periphery and are either blunt or pointed. In this way the outline of the blood platelet is continually changing. Fig. 2 represents an attempt to indicate the changes in form which a single blood platelet undergoes in less than half a minute. In this case, of course, no attempt has been made to actually draw the changes of form, for when the composition of the agar is most favorable these changes are altogether too rapid. Frequently the blood platelets are found, during the period in which they are actually projecting pseudopodia, to move slowly about the field. This is without doubt an independent amœboid movement. The smallest forms as well as the largest possess this power to move themselves about.

From the description above given it will be seen that the blood platelets, although closely conforming to the small, granular amœboid bodies of Reed, differ from the second order described by him in the absence of pigment. It is difficult to say as to

PLATE I

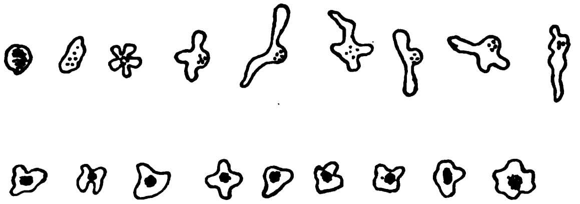


Fig. 1, after Reed.

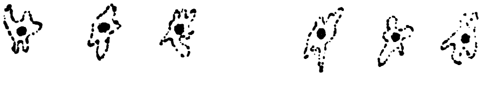


Fig. 2, after Deetjen.

PLATE II

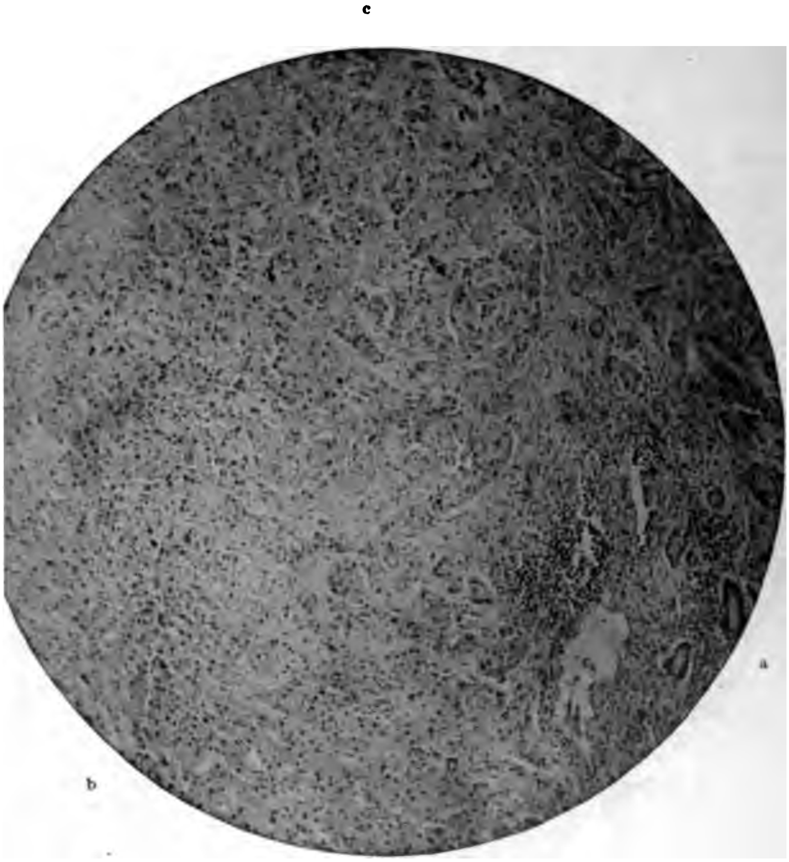


Fig. 3. Inoculation carcinoma of dog's liver; *a*, periportal area; *b*, normal liver; *c*, nodule.

Plate III

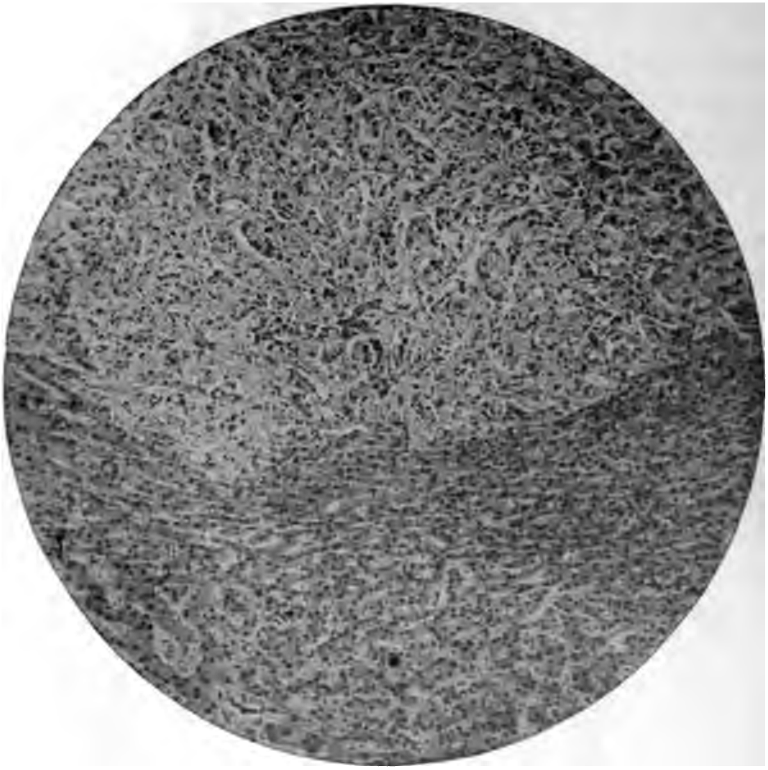


Fig. 4. Margin of inoculation carcinoma in dog's liver. Low power.

PLATE IV

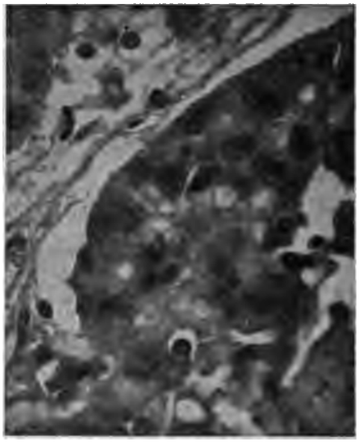


Fig. 5.

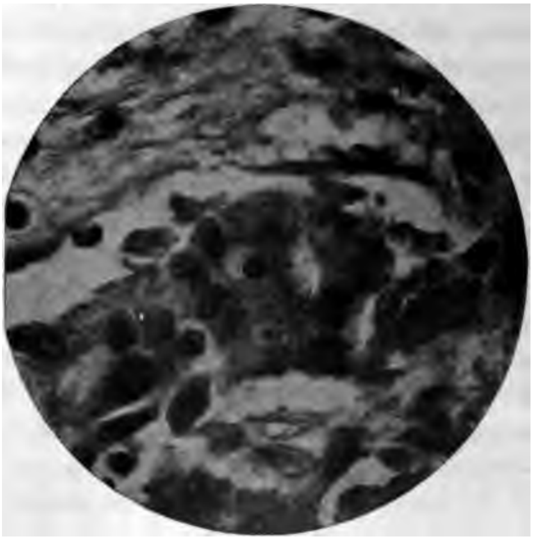


Fig. 6.

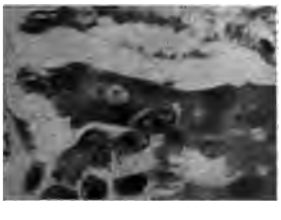


Fig. 7.

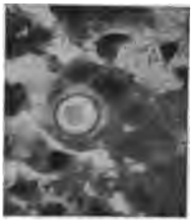


Fig. 8.

ther the highly refractive central body which Deetjen holds e a nucleus and the statement which Reed makes that he has r demonstrated a nucleus, are simply differences of interpre- on or represent actual differences in the amœboid bodies in tion. In the larger bodies which we have observed in the toneal fluid in cases of cancer we have observed a certain lensation of the central portion of the protoplasm which we to represent a nucleus; but a nucleus, in the sense of nuclei, e know them in tissue elements, has, of course, never been rved.

fter a comparison of our own observations with those of Reed, the more recent results of the investigation of Deetjen, one ld be inclined to dismiss the entire matter with the belief that Reed and ourselves had simply observed the amœboid form e blood platelet. This would be the case had we not recently me acquainted with the amœboid form of the parasite Plas- iophora Brassicæ. The swarm spores of this organism are ate masses of protoplasm which when first liberated from the e cysts (see Figs. 1 and 2) are homogeneous. They are from 4 micromillimeters in diameter, but increase in size until become transformed to typical myxamœbæ.

the swarming stage these organisms frequently show active boid motion, rapidly throwing out and retracing pseudopodia spine-like projections from the margin of their protoplasm. y frequently contain one or more granules of pigment and a eus is not demonstrable. A comparison of the illustrations Woronin (Fig. 3, Article on Plasmodiophora Brassicæ) will nce show the similarity of this phase of Plasmodiophora to amœboid bodies in question. The difficulty of fixing and ning this form of Plasmodiophora as well as the lack of suc- in fixing and staining the amœboid bodies in vaccine and e which we have seen in the peritoneal fluid in cases of cancer, thus far frustrated any attempt at a more accurate com- son, and until more suitable methods are developed, the en- matter must be left in abeyance. While the work of Deetjen ests a more simple solution of the significance of these bodies, ain forms of organisms belonging in the class of Plasmodiophora Brassicæ so closely resemble them that it is not impossible that they represent the amœboid form of some parasite. The lack of well-defined characteristics in the swarming stage of the Myzomycetes greatly increases the difficulty of the problem, but the recognition of the fact that such forms do exist cannot fail to advance our knowledge and may possibly lead to an explanation of some of the obscure problems in infections of undetermined etiology.

Since our last publication we have found but one case of peritoneal fluid in cancer in which we detected the actively moving amœboid forms already described. A number of animals were injected with this fluid, and in one of them, a dog (No. 18), which we arbitrarily killed some ninety days after injection, we found that the liver was filled with firm, whitish nodules which, on section, proved to be new formations derived from the hepatic epithelium. The tissue was hardened in sublimate and on sectioning and staining, according to Plimmer's method, a lesion of almost unique characteristics was found. The nodules varied in size from that of a grain of rice to that of a small pea. They were essentially all of the same character, and a description of one will suffice for all.

Under low power the nodules may be readily distinguished by the fact that the epithelium of the nodule is not as deeply stained as that of the surrounding hepatic parenchyma. At the margins of the nodules areas will be found in which the hepatic parenchyma is flattened, but at the greater portion of the periphery the cells are seen to lose their typical arrangement, grow irregularly into the structure of the nodules, staining more brilliantly with the neutral red and present a great variety of form. (Fig. 3.) This merging of the typical arrangement of the hepatic epithelium into the irregularly formed epithelium of the nodule is quite abrupt. (Fig. 4.) With low power numbers of vesicular inclusions can be seen in the epithelium of the nodule. These are extremely frequent, nearly every cell containing one or more. Toward the center of the nodule these inclusions are apparently larger than those near the periphery. At three different points in the periphery of the nodule, are included perivascular connective tissue areas. In each of these the connective tissue stroma is but slightly affected, with the exception of a moderate amount of round-celled infiltration. The epithelium on all sides shows definite evidence of proliferation, whereas the stroma of the periportal area and the epithelium of the gall ducts is unchanged. At the margin of one of these periportal areas is a narrow strip of hepatic epithelium, which has, for the most part, retained its distinguishing characteristics.

Under high power the cell inclusions can be readily distinguished and present all the characteristics of the so-called bird's eye inclusions. (See Figs. 5, 6, 7, 8.) They vary in size from 3 to 10 micromillimeters. The smaller bodies are distributed about the periphery of the nodule and a careful examination of the adjoining normal hepatic structure shows that *without exception the inclusions stop abruptly at the margins of the nodule. In no case have we found a single inclusion beyond the area of transformed epithelium.* The epithelium forming the nodule presents many bizarre forms, the nuclei stain deeply, the outlines of the cell are irregular, the protoplasm takes the neutral red. Passing toward the center of the nodule it will be found that the majority of the inclusions increase in size, and in some cases the structure shows evident signs of disintegration. In many cases the protoplasm of the cell is distended by a large vacuolar space, and in some of these spaces well-preserved leucocytes can be found. It would appear that at the center of the nodule the inclusions have undergone disintegration. Careful examination of the inclusions shows that the predominating form is that with a well-defined margin and spherical or irregular central body. In some of the inclusions the central portion of the central body takes the nuclear stain. In some of the larger inclusions a central body, with grains of chromatin distributed in a circle midway between the center and periphery, are to be found. These larger inclusions frequently present the appearance of poorly-formed cysts embedded in the protoplasm, and in some groups of hyaline bodies are easily distinguishable. This transformation in the inclusions suggests some abortive attempt at development. The penetration of leucocytes into the larger structures is in our experience unique. We would conclude from the appearance of the epithelium of this nodule that we are dealing with an infection of the hepatic epithelium progressing at the periphery. A few karyokinetic figures can be found, and the evidences of compression, at certain portions of the periphery of the nodule, indicate that it is increasing in bulk. *The appearance of the epithelium and the entire structure of the nodule are those found in primary carcinoma of the liver.* The arrangement and distribution of the inclusions indicate that they are intimately associated with the proliferation of the hepatic epithelium.

In the light of this experiment we are naturally inclined to adhere to our belief in the specific nature of the small amoedoib bodies which we have observed in the peritoneal fluid. We have examined a number of peritoneal exudates in cases of widespread carcinoma of the abdominal organs without finding them. It is therefore evident that they are not always present. We have been unable to determine the conditions under which they appear, and it is not improbable that they are present at certain times during the progress of the disease and absent at others. The lesions which we have thus far observed in animals, as the result of inoculation or injection with peritoneal fluid containing these amœboid bodies, have led in a few instances to epithelial proliferation, in this *last case associated with the presence of large numbers of intracellular inclusions presenting all the characteristics of the typical bird's-eye inclusions in cancer.* At the same time these proliferations have presented the characteristics of primary infections of the epithelium, and in no case have been associated with metastasis. We are, therefore, inclined to the belief that they are abortive and represent an unusual state of affairs produced by the unnatural introduction of the organism under such conditions that it is incapable of producing more than a temporary proliferation of the epithelium. While this line of investigation has proven extremely suggestive, it does not seem to us that in this way the problem can be brought to ultimate solution. *It is extremely probable that the introduction of an ectogenous cycle, probably in the body of some intermediate host, is necessary before the organism is capable of a primary infection.*

For the purpose of increasing our knowledge of parasites, which might be viewed as being more or less distinctly related to the forms we have observed in cancer, which we believe to be parasitic, we have undertaken an investigation of certain protozoan parasites, and because of striking characteristics which the organism presents we have undertaken a study of the intracellular parasite of clubroot, known as Plasmodiophora Brassicæ. A description of this organism, so far as our investigations have led us, is hereby submitted.

many points in the cycle still remain to be determined. Doflein divides the order into two suborders, Protomyxidea and Mycetozoidea.

The organism we are considering is placed by this author in the first suborder. The developmental cycle of these organisms differs according to their position in the scale. The higher, those which most closely approximate the fungi, present more or less complicated cycles, but in none has a sexual phase been determined. So little is known about them, however, that it is highly probable that we are but imperfectly acquainted with the life cycle of even the lowest forms. The simplest form of the Mycetozoa is found in a minute mass of protoplasm, the so-called swarm spore, which develops into Myxamœbæ. In this phase the Myxamœbæ may change their form, protrude delicate flagella and are then known as myxoflagellates. The flagellate and amœboid forms are practically interchangeable. As an amœba the organism contains a more or less well-defined nucleus and occasionally a contractile vacuole. It may divide and in this way increase in number; it may become encysted as a single amœba, or certain of the organisms may increase in size until cysts of considerable dimensions are formed in which there develop a number of spores. In all probability this stage is preceded by some form of copulation as yet undetermined. The spores in this case, after liberation from the cyst, probably develop within them swarmers, which, on escaping, take on the form of Myzamœbæ or flagellates. Fig. 2, adapted from Doflein, illustrates what is known of the cycle of the *Protomyxidea*, the suborder to which *Plasmodiophora* belongs. Question marks inserted in this cycle indicate that possible intermediary stages are as yet undetermined.

The organism *Plasmodiophora* as described by Woronin was first noted in the spore form as minute, spherical, yellowish-green bodies of uniform size, filling the enlarged cells of the infected plant. (Fig. 3.) These cells were usually arranged in groups. Besides the spores, Woronin recognized the presence in certain cells of large masses of protoplasm more or less filling out the sap spaces of the cell. These he viewed as the plasmodial form of the organism.

PLATE V

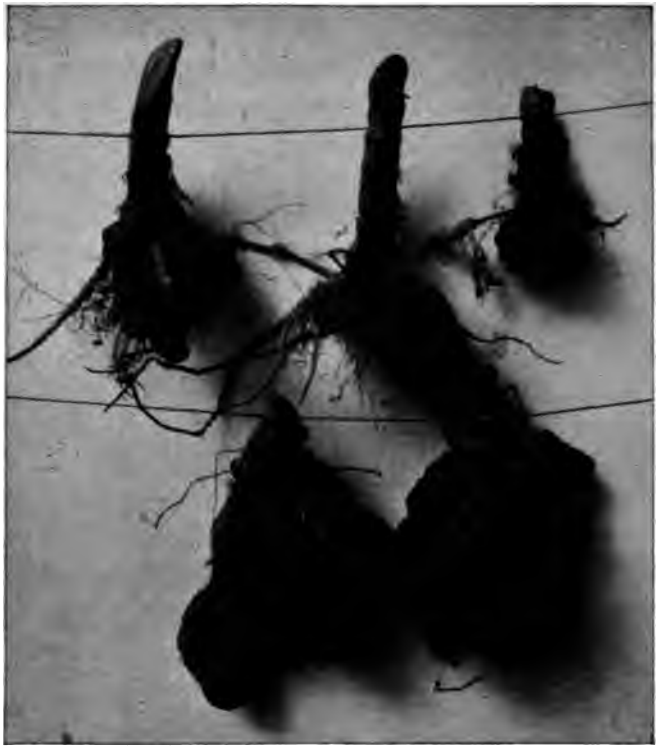


Fig. 1.

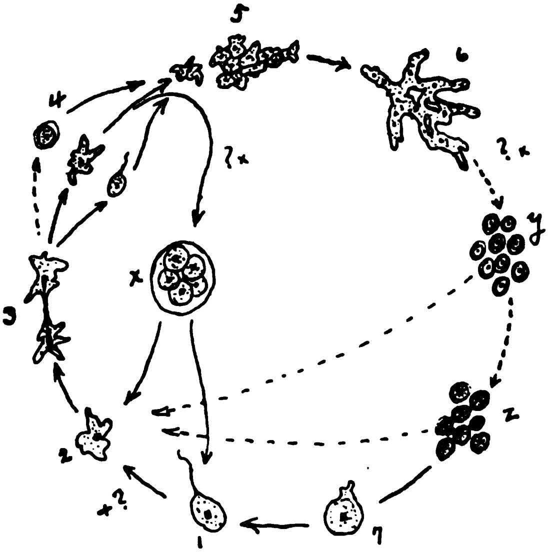
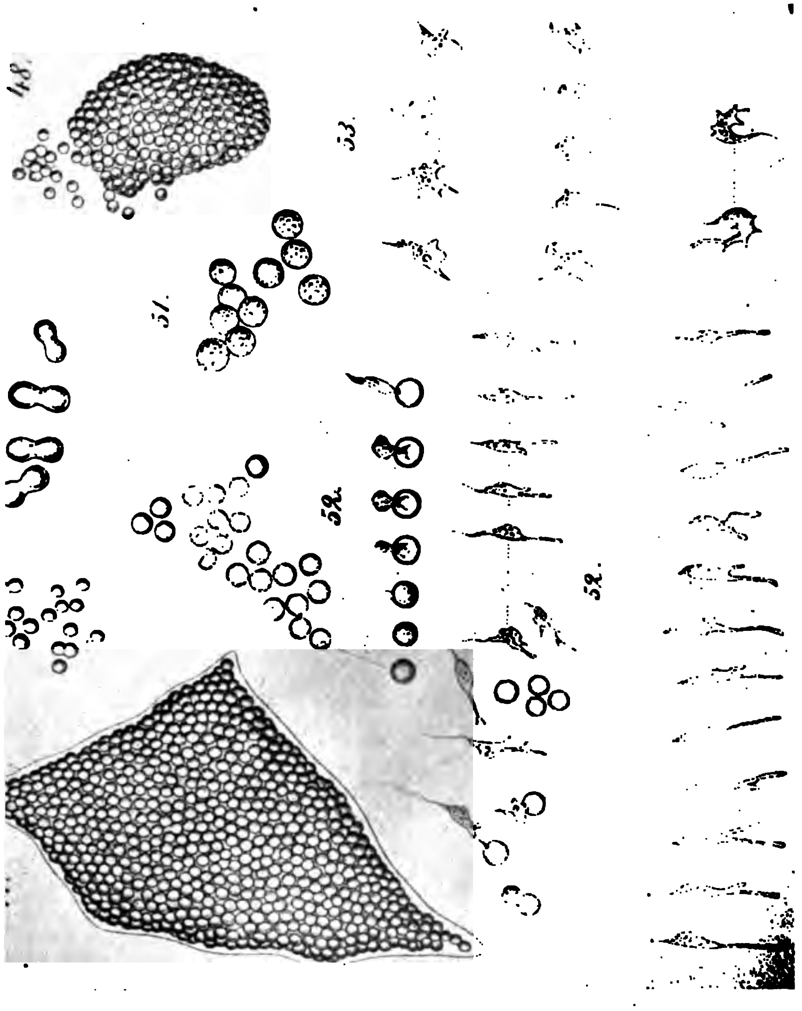


Fig. 2.

PLATE VI



Figs. 47, 48, 49, 50, resting spores; 51, beginning germination; 52, escape of the myxamœbæ from the cysts; 53 free amœbæ.

As to the ectogenous phase of the parasite, Woronin noted that spores presented a definite delimiting capsule within which nular protoplasm could be detected. The mass of protoplasm hin the cyst later developed into a definite body or swarmer ch, on the bursting of the cyst, was liberated and thereupon k on the form of an amœba, showing more or less active eboid motion, or protruding delicate flagella and moving about field in the form of a flagellate. Fig. 3, after Woronin, suffi- tly illustrates this phase of the organism. Woronin deter- ed that the organism observed was the cause of the tumor-like growths in which they were found, by infecting ground with dried roots of infected plants. By so doing he established ond question the relation of the organisms to the disease. pon the disintegration of the roots the spores of the organism ain in the ground until the following season, when with the ent of warm weather the swarm spores are liberated from the re cysts and infect the growing plants. The exact method by ch the amœboid or flagellate form of the organism enters the nfected plant has never been definitely determined, but it is erally supposed to be by means of the root hairs.

nfection may occur, according to Woronin, at any period ing the life of the plant and affects not only early but late etables.

The article of Woronin remained for many years the only ex- sive investigation of this organism. Many notes as to its oc- rence, methods of prevention, etc., are to be found in the icultural literature, but no advance was made in the subject il the publication of Nawaschin.[1] This author undertook an estigation with modern histological methods to clear up the cure phases of the organism in the plant cells, to investigate changes produced in the plant by the organism, and the nature the relations between the cell and the parasite. It may be re- rked that the closing paragraph of Woronin's article called ention to a possible relation between these tumors in plants those found in man and animals. The wording of this para- ph is so significant in the light of present investigation and it is so seldom referred to, although made in 1878, that it would seem desirable to give it verbatim:

---

[1] Flora. Bd. 86, H. 5, 1899.

> Ich vermuthe nämlich, dass die Erscheinung und Entwickelung vieler pathologischer Auswüchse und Anschwellungen, die auf dem thierischen Organismus vorkommen, auf folgende Weise erklärt werden können: In den lebendigen Organismus dringen, auf irgend welchem Wege, kleine Myxamöben ein, die sich allmählich in Plasmodien entwickeln und im Gewebe dieses oder jenes Organs eine bedeutende Reizung hervorrufen; dieses verursacht im Organ eine pathologische Veränderung des ganzen Gewebes, von welcher denn auch die Form und Grösse der krankhaften Auswüchse oder Anschwellungen abhängig sind. Nächstfolgende Untersuchungen werden zeigen, ob meine Vermuthung sich bestätigen lässt.

In the introduction to this article Nawaschin calls attention to the closing paragraph of Woronin's article above given, and notes the fact that from the standpoint of general pathology Plasmodiophora is worthy of special attention as an intracellular parasite, producing a specific tumor which bears many analogies to the so-called "malignant" tumors in animals and man. He furthermore calls attention to the fact that Plasmodiophora undoubtedly stands very close to the Sporozoa, the recognized cause of many infections in animals. Nawaschin's work deals exclusively with the results of sectioning and the staining of the plant tumors, and has thrown much light on the intracellular phases of the organism. This, he finds, makes its first appearance within the plant cell in the form of a well-developed amœba, which in osmic acid preparations (Flemming or Hermann) may be immediately detected within the plant cell as a mass of closely packed, regular, blackened, granules. On careful examination with higher powers these granules are found to be embedded in a mass of protoplasm with more or less well-defined outlines. (Fig. 4.) Between the granules one or more clear spaces will be found within which a spherical, centrally placed body, bright red in safranin preparations, can be distinguished. These prove, on further observation to represent nuclei. If the osmic acid is removed from the preparations these nuclei are found to be surrounded by the protoplasm of the amœbæ. The youngest amœbæ observed by Nawaschin have always possessed at least two nuclei. These present definite characteristics. They are spherical or oval in the resting stage, have a fairly well-developed nuclear mem-

Plate VII

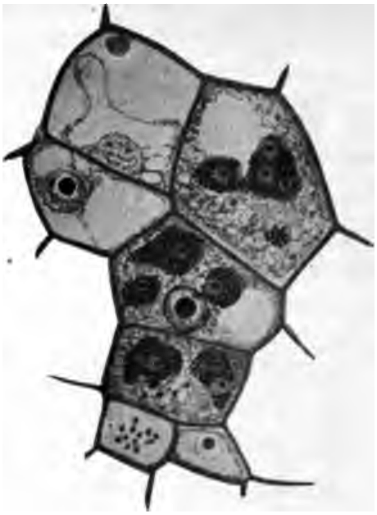


Fig. 4

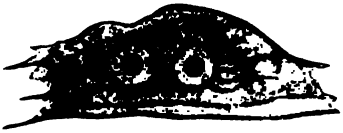


Fig. 5.

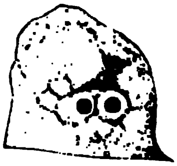


Fig. 6.

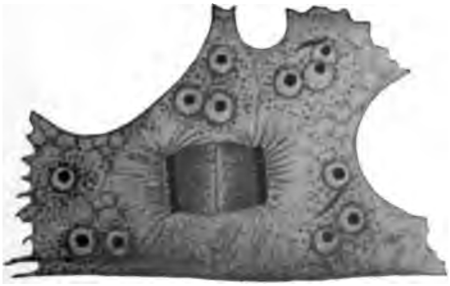


Fig. 7.

brane, are apparently filled with a clear fluid and possess a highly refractile central body, as he expresses it, " of nucleolar nature." The infected plant cells are always arranged in groups, and each cell usually contains more than one amœba.

The normal plant cell possesses a well-defined membrane of cellulose lined by a narrow layer of protoplasm which extends in bridges to the nucleus, which lies in varying positions within the cell cavity. The spaces between the bridges of protoplasm are filled with cell sap. It is within the sap spaces that the amœbæ first make their appearance. The method of their entry as swarm spores into the infected plant is, as we have stated, as yet undetermined. The nucleus of the plant cell is spherical, oval or of irregular shape, possesses a nuclear membrane and a large, spherical or irregularly shaped nucleolus. It is many times larger than the diameter of the largest nuclei in the amœbæ and can readily be distinguished by its characteristic appearance. The conditions within the plant cell are so simple that the morphology of the parasite and its relation to the cell can be determined with great accuracy. Fig. 4, after Nawaschin, represents a preparation from which the osmic acid has not been removed, and the amœbæ are seen within the plant cell sharply defined by the regular, black granules embedded in their protoplasm. The differentiation of the protoplasm of the amœbæ in preparations from which the osmic acid has been removed is not invariably well-defined. This is especially true of the very young organisms. In these the protoplasm of the organism may be poorly developed, and in fact consist of mere threads extending into the surrounding plant protoplasm, in which it is apparently lost. Figs. 5 and 6, from Nawaschin, represent two young amœbæ immediately after division of the nuclei. The protoplasm in these cases presents the characteristics just mentioned.

While Woronin believed that the increase in number of amœbæ within certain cells was probably owing to the fact that the organism at this stage passed from one cell to the other, Nawaschin has shown that this interpretation is incorrect. He has never been able to detect any amœba in the act of passing through the wall pits of the cells. He has been able to determine that they increase in number by division, that the presence of the organisms for a long period causes no change in the plant cell; that during this stage *the organism lives in a state of symbiotic relation with the host cell, until through proliferation the number of amoebae in the plant cell makes sufficient demands upon the nutrition of the cell, whereupon the host cell divides by the regular process of karyokinesis.* The amœbæ in this case are more or less equally distributed in the daughter cells. (See Fig. 7, from Nawaschin.) By this means, according to Nawaschin, the organism is distributed in the diseased portions of the plant. The fact that the infected cells lie in groups is thus explained. When, however, the demand upon the infected cell can no longer be met, and the nutrition is finally exhausted, the amœbæ pass through certain preparative changes, finally coalesce to plasmodia, the nuclei all divide by the regular process of karyokinesis and the entire mass is divided up into minute myxamœbæ, each with a single nucleus. These myxamœbæ secrete a membrane about them, take on a spherical form and become condensed into spherical spores. There is no sac (peridium) formed about the plasmodium in this process of spore formation, but as Woronin has pointed out, in all probability the absence of the peridium is due to the fact that there is no necessity for this formation, the walls of the exhausted plant cell performing this function.

The first evidence of nuclear division is found in the appearance within the clear space between the periphery and central body of minute grains of chromatin irregularly placed. These arrange themselves in a plane, which later becomes that of division, in a circle about the central body. This first becomes elongated and then divides. A longitudinal section at this stage shows two closely approximated central bodies with two small grains of chromatin in the plane of division, but close to the divided central body. In cross section this figure usually presents the appearance of a rosette, the central body being surrounded by more or less equi-distant granules of chromatin. The central bodies then withdraw to the poles of the cell and half of the chromatin becomes intimately associated with each. The elongated nucleus

then divided into two spherical smaller nuclei by the capsule
ssing into the center and coalescing. In this phase it com-
nly occurs that the entire elongated nucleus is bent upon itself,
ich results in the nuclei, when completed, being placed at a
ght angle to each other and presenting a characteristic appear-
ce, as shown in Fig. 6, from Nawaschin. Nawaschin has not
empted to analyze this method of nuclear division, but it will
seen that it is entirely distinct from the process of coalescence
d regular karyokinetic changes in the resulting plasmodium
ich terminates in spore formation.

It will be seen by observing the illustrations taken from Nawas-
in that the nucleus of the amœboid form of Plasmodiophora
sents a very distinct similarity of appearance with the cell
lusions noted in cancer, a fact which has been noted by von
yden and others.

The analogy between the tumors resulting from the infection of
e plant by this organism and malignant tumors in man and
imals, as pointed out by Woronin, was emphasized by the ob-
rvations of Behla,[1] who noted the great frequence of clubroot in
e gardens of the inhabitants of a certain portion of the town of
ckau, in which cancer was particularly prevalent. He likewise
und that fragments of the plant tumors inoculated into animals
oduced swellings and tumor-like formations, but he was unable
detect the parasite in the animal tissues. A more direct sup-
rt of the analogy is to be found in the preliminary statement
Podwyssotzki, 1900, who found that animals inoculated with
gments of clubroot developed tumors which possessed certain
ints of similarity to the sarcomata and endotheliomata. The
tention of Podwyssotzki was attracted to Plasmodiophora Bras-
e through the work of Nawaschin, both of these observers being
mbers of the faculty of the University of Kieff. Podwys-
tzki's conclusions are of such great interest that it is desirable
quote them in full:

> . It is possible to produce by inoculation with Plasmodiophora
> assicæ tumors in animals, thus far rabbits and guinea-pigs.

Behla. Die geographisch-statistische Methode als Hülfsfactor der
ebsforschung. *Zeit. f. Hygiene u. Infectionskrankheiten*, Vol. 32, p. 123.

2. These tumors are of mesodermic origin and in the progressive stage are similar to large celled sarcomata or endotheliomata, or the granulomata found in leprosy.

3. These tumors are the result of a marked hypertrophy and proliferation of the fixed connective tissue elements, especially the endothelium of the perivascular lymph spaces. One is, therefore, justified in speaking of a mycetozoan perithelioma or granuloma. The proliferation leads to the formation in the neighborhood of the blood vessels of larger or smaller infiltrations or nodular formations. Leucocytic infiltration is demonstrable in the first stages of the infection, but disappears from the eighth to the twelfth day.

4. The spores of Plasmodiophora Brassicæ are found in the tumor cells either singly or in great numbers. In the latter case the cells are greatly distended and the spores are surrounded by a mucin-like substance which gives the whole the appearance of a plasmodial mass filling the body of the cell.

5. The more mature tumor cells contain the greater number of spores. Many of these are so greatly distended and show such marked vacuolization that they are apparently being destroyed. For this reason the central portion of the tumor is often represented by a yellowish, half dry mass of disintegrated cells.

6. The most peripheral or youngest elements of the tumor contain fewer of the spores. These are difficult to demonstrate. It can only be accomplished by a careful comparison of the different stages of metamorphosis from the centrally arranged older cells of the tumor containing large numbers of well-defined spores.

7. In many places in these tumors may be found giant cells, including within their bodies numbers of spores. In some of these giant cells the spores have disappeared.

8. The nuclei of the infected cells for a considerable period show no changes aside from increase in size and chromatin content. Many of the cells containing spores show evident mitosis, proving that the parasite induces proliferation of the nuclei.

9. The picture presented in these nodular formations can be most easily understood as evidence of specific phagocytosis, as undoubtedly many of the spores are destroyed within the cells, in which case they gradually become incorporated with the protoplasm of the cell and can no longer be differentiated. It was undoubtedly the cells of this sort which were observed by Behla and which led him to the conclusion that portions of clubroot after transplantation into animals produced infection, although the parasites could not be detected within the cells.

10. It would seem that the nuclear substance of the spore undergoes a progressive metamorphosis. In many of the spores two or more chromatin containing nucleoli may be found. The spore in this case presents an appearance suggestive to the differentiation found in mitosis. It is, however, impossible to affirm with certainty that an actual increase of elements within the spore occurs. This question must be the subject of future investigation. In many cells, however,

parasite may be found without the characteristic capsule. Under r circumstances it would be difficult to explain the infection of cells far from the center of the tumor without an increase of elements hin the spore, as it is impossible that the comparatively large spores out the size of an erythrocyte) should be carried by the lymph ough the small lymph spaces. Spores within the leucocytes have er been encountered.

1. The larger cells in sections fixed in Flemming's fluid present an remely interesting picture. Surrounding the single spores the adja- it protoplasm of the tumor cell is filled with closely arranged minute , droplets, so that the infected cell is readily detected even with low wer. Such cells present the appearance of a vacuolated cell, each cuole surrounded by fat droplets. Under oil immersion the structure the cell can be readily determined, and it would appear that the inute fat droplets are a portion of the parasite, the protoplasm of hich, in the vegetable tumors, is normally filled with fat droplets. e fat remains within the spores after implantation in the tissues of imals, so long as the spore remains free. It diminishes in the spores soon as they are taken up by the connective tissue cells. When is has occurred the spores gradually lose their fat, with the excep- on of one or two minute fat droplets within the capsule.

12. In an extremely malignant case of sarcomatosis of the perito- eum, kidneys, thyroid and other organs of a child, from the clinic of rofessor Tchernoff, I have observed the presence of cells presenting e characteristics of those above described. They were especially rominent in preparations hardened in Flemming's fluid, where they ould readily be detected with low power because of the blackening esulting from the presence of the fat. Under oil immersion these cells ere found to contain a number of minute round bodies within vacuoles. further report of these parasitic inclusions will appear later.

Since the appearance of the preliminary statement of Podwys- otzki no one has apparently disproved or confirmed his results. ne or two observers have confirmed the similarity of appearance etween certain forms of Plasmodiophora and the inclusions in ncer (von Leyden, Feinberg) while others (Lubarsch, Nösske) elieve that this analogy is not justified.

Results of inoculation experiments with Plasmodiophora.— rly in 1901, through the kindness of Professor Welch, we came to possession of the article of Nawaschin, which naturally fixed r attention upon the preliminary statement of Podwyssotzki, ove mentioned. Since that time we have been experimenting ith Plasmodiophora in various ways. Through the kindness of r. Erwin F. Smith, of the Laboratory of plant pathology, Wash- gton, D. C., we were placed in communication with Prof. L. R.

Jones and Mr. W. J. Morse of the Agricultural experiment station at Burlington, Vermont. These gentlemen have repeatedly furnished us with young clubroots, grown for us in their greenhouses during the winter. Through Dr. Smith we were likewise placed in communication with Dr. M. C. Potter of the Durham college of science, Newcastle-upon-Tyne, from whom we were able to obtain a quantity of clubroots from England. Careful comparison of the Plasmodiophora obtained from this source and that found in America shows no distinguishable difference. To all of the gentlemen mentioned we are deeply indebted and desire to express our thanks for much assistance.

With the material obtained from these sources, and with clubroot obtained from the neighborhood of Brookfield, N. Y., where the disease is prevalent, to which our attention was called by Dr. I. P. Lyon, and the neighboring town of Hamilton, where it is apparently still more prevalent, we have had no difficulty in infecting earth. Cabbages and other varieties of Brassicæ grown upon this ground, either in the greenhouse or in the open, in a prepared bed at the rear of our Laboratory, have supplied us continually with material. Fig. 8 is a photograph of a specimen raised in the bed above mentioned during the past summer. We began our investigations by careful examinations of the fresh material. The spores of the organism could be readily detected in freehand sections, or in scrapings from the fresh surface of the clubroot. Many of the infected cells were found filled with these closely packed spherical bodies. (See Figs. 3-43, from Woronin.) They measured 3.33 μ in diameter. Some of them were homogeneous (see Figs. 3-49, from Woronin). In some a delicate outline within the delimiting capsule could be observed, and in the majority one or more highly refractive bodies. *The relation of these spores to osmic acid was ascertained with the result that the various forms were found to blacken after treatment of a few hours. This blackening affected the capsule of the spore and the highly refractive central body.' Where the spores were homogeneous they took on diffuse blackening.* The color was usually yellowish-green, rarely of a brownish tinge. *When treated with Sudan III, some of the spores stained intensely while others took up the stain less rapidly. In the spore forms*

PLATE VIII

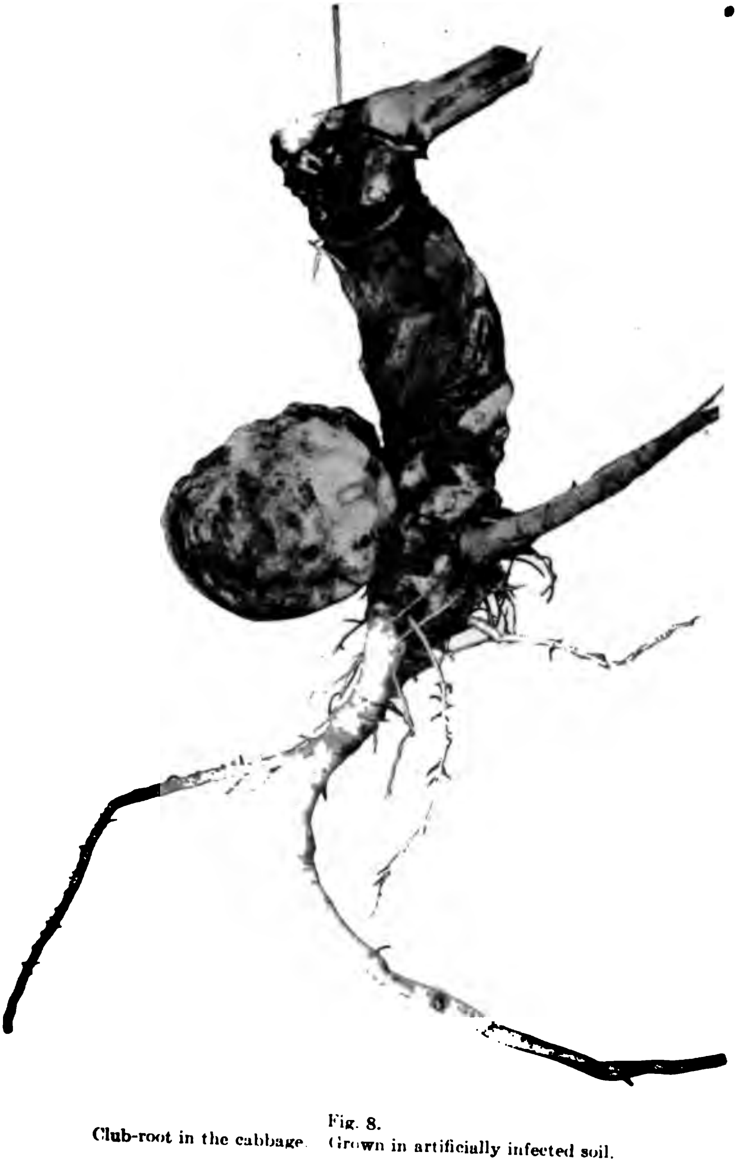


Fig. 8.

Club-root in the cabbage. Grown in artificially infected soil.

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[illegible]
[illegible]

ntaining a well-defined, highly refractive central body, this and e capsule were usually first blackened by osmic acid or stained Sudan III, as the case might be.

In young clubroots the amœbæ described by Nawaschin could readily detected. These were found in the form of spherical oval masses of protoplasm within the sap spaces of the plant ll, filled with coarse granules, approximately one micromilli- ter in diameter. These granules were highly refractive, and in ny cases were in active motion. The nuclei of the amœbæ were sible as vacuoles in the protoplasm, and occasionally a highly fractive central body could be observed. The whole appearance these forms, *with the exception of the nucleus*, could only be mpared to that of an eosinophile, as they appear in fresh prepa- tions. The striking character of this resemblance was ex- mely impressive. Occasionally free amœbæ could be detected the fluid of the scrapings, in which case they were spherical, e granules usually in active motion. Attempts were made to and stain them, but without great success, the best results ing obtained in the sections to be described later.

This phase of the organism will continue to offer a field for research r some time. The observations thus far reported are largely con- matory, with the exception of certain forms thus far undescribed. n article on the staining affinities of various forms of the organism ill be published shortly by Dr. Matzinger, with whom the observations the ectogenous cycle of Plasmodiophora Brassicæ were jointly nducted.

For the purpose of observing the development of the organism ortions of dried clubroot were placed in flasks containing sterile ater and allowed to remain at room temperature. In many ses the water in the flasks was rapidly overgrown by bacteria, t in a few cases where the bacteria did not develop with such pidity we were able to trace the development of the swarmers ithin the spore cysts, their liberation from the spore cysts and eir presence free in the fluid. The smallest recognizable form the organism (swarmers) is a spherical, highly refractive body sembling a minute drop of fat, varying in size between 1 and μ, *each having attached to it a delicate, thread-like flagellum, fine as to be scarcely distinguishable even with the highest wers. This minute, spherical form of the organism moves* *about rapidly in the field by the movement of this delicate thread. In preparations treated with osmic acid the body of this form of the organism fails to blacken even after prolonged treatment.* The next recognizable forms of the organism are the myxamœbæ and myxoflagellates, the latter being more common. The swarmers can be seen developing within the spore cyst, as described by Woronin (see Figs. 3-51-52). Our experience in this connection is of interest, inasmuch as no less an authority than Tubeuf[1] has recently stated that he has never been able to observe this phase and that the late Professor Frank had likewise never succeeded in causing the spores to develop into cysts with the liberation of the swarmers. von Leyden has also made the same statement.

The development of the swarmers within the spores begins by the spore increasing in size to about 4 to 6 μ, the highly refractive body within the spore sac gradually disappearing and the contents of the sac taking on a well-defined granular character. This granular protoplasm (also shown by Woronin) gradually contracts until the mass within the spore sac can be easily distinguished from the surrounding membrane. At the proper time the spore sac bursts, liberating the mass of protoplasm, which, after passing into the surrounding medium, takes on the form of a myxamœba or of a myxoflagellate. The protoplasm of the organism at the time of liberation is homogeneous. A nucleus can occasionally be observed, but is extremely indistinct. All attempts to harden and stain the organisms in any of the forms described have given but unsatisfactory results. In the most successful attempts the organism appears as a mass of protoplasm of rounded or irregular form, with a center staining somewhat more deeply than the surrounding protoplasm. We have never been able to demonstrate the presence of a contractile vacuole. The organism in this stage is so lacking in characteristics that all attempts to establish a means of identification have been unsuccessful.

Inasmuch as it is in this phase that the organism is supposed to infect the plant, we have attempted to detect the swarmers and flagellates in the tissues of animals. Cultures containing ge numbers of the swarmers have been injected into animals ravenously and directly into the tissue, the animal being killed l the tissues hardened within a few minutes after the injection. no case have we definitely succeeded in locating the swarmers their appearance. *Once in the tissue, becoming rounded, they sent an appearance so like structures usually interpreted as eneration products, that it is impossible at present to recoge the organism with certainty.*

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[1] Verhandlungen der Komité für Krebsforschung. Sitzung am 9 Januar 1902.

Examinations of clubroot by means of hardened and stained tions.— The staining method which we have principally utilized the method of Plimmer, inasmuch as we desired from the beginng to compare the appearances of the organism to the cell clusions in cancer, as demonstrated by this method. The ethod recommended by Nawaschin has likewise been employed, d as given by this author is as follows: Very small portions the infected root are placed in strong Flemming's solution, here they are allowed to remain 20 to 24 hours, when they ould be removed, as longer action of the fixative permanently lackens the protoplasm of the organism. After embedding in araffine, sections two or three micromillimeters are cut and atached to the slide by cohesion. When it is desired to remove he osmic acid from the preparation the sections and slides are laced in hydrogen peroxide, full strength. Preparations are ounted in thickened cedar oil stained with Feinberg's safranin-entian-violet-orange stain. Sections are first stained with one er cent safranin solution, washed in water and then countertained with two per cent gentian-violet solution. Pass through lcohol and clear in clove oil which has been saturated with range, in which they may remain a considerable length of time ithout overstaining. They may then be cleared with xylol and ounted in balsam, or cleared in commercial oil of cedar and ounted in thickened cedar oil.

This method gives excellent preparations, but in no way iperior to those obtained by the method recommended by Plimer for the demonstration of cellular inclusions in cancer.

Sections of mature clubroots are distinguished by groups of ypertrophic cells filled with closely packed spores. Preparaons hardened in Hermann and stained with safranin show that *about rapidly in the field by the movement of this delicate thread. In preparations treated with osmic acid the body of this form of the organism fails to blacken even after prolonged treatment.* The next recognizable forms of the organism are the myxamœbæ and myxoflagellates, the latter being more common. The swarmers can be seen developing within the spore cyst, as described by Woronin (see Figs. 3-51-52). Our experience in this connection is of interest, inasmuch as no less an authority than Tubeuf[1] has recently stated that he has never been able to observe this phase and that the late Professor Frank had likewise never succeeded in causing the spores to develop into cysts with the liberation of the swarmers. von Leyden has also made the same statement.

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Sections of mature clubroots are distinguished by groups of pertrophic cells filled with closely packed spores. Prepara- ons hardened in Hermann and stained with safranin show that many of the spores are blackened by the osmic acid. Those which do not show the black reaction stain diffusely with the safranin. The dense delimiting membrane in the unblackened spore can be detected by a slight difference in the refractive index. Within this an irregular outline, possibly representing the protoplasmic content of the spore, is distinctly visible. The spores present a most interesting appearance in preparations from which the osmic acid has been removed and treated with the following steps of Plimmer's method. In this case it has been found that the reaction of the spore to the iron haematoxylin is almost as capricious as its relation to osmic. Many of the spores are stained a diffuse blue-black, in which case the internal structures are obscured. A certain number are entirely resistant to the nuclear stain, in which case the irregular internal structure can be readily observed. (Fig. 9.) The spores are of uniform size and measure, as above stated, 3.33μ. The amœbæ present the characteristics already given by Nawaschin. In the [illegible] roots examined they are the predominating form and *in the* [illegible] *young outgrowths the spores are entirely absent.* The nuclei [illegible] the amœbæ stain with a protoplasmic stain, Plimmer's [illegible] thus presenting an appearance extremely like that of the [illegible] "Plimmer's body," the characteristic cell inclusion of [illegible] They vary considerably in size in the different amœbæ, [illegible] nuclei in each amœba are of practically the same dimensions. (Fig. 10.) We have detected nuclei as small as two micromillimeters in diameter and others five micromillimeters. Most of the nuclei are spherical in outline, but many oval or fusiform nuclei will be encountered. The protoplasm of the amœbæ in osmic acid preparations is either granular or coarsely reticulated, depending upon the success of the fixation. The outlines of the mature amœbæ can be readily determined, *but in the younger forms, as pointed out by Nawaschin, the protoplasm is intimately associated with the protoplasm of the plant cell and is often poorly developed, in which case the nucleus presents an appearance extremely like the cell inclusions in cancer. The central body stains somewhat more intensely than the nuclear membrane. The nuclear membrane of the smaller nuclei is, as*

Plate IX

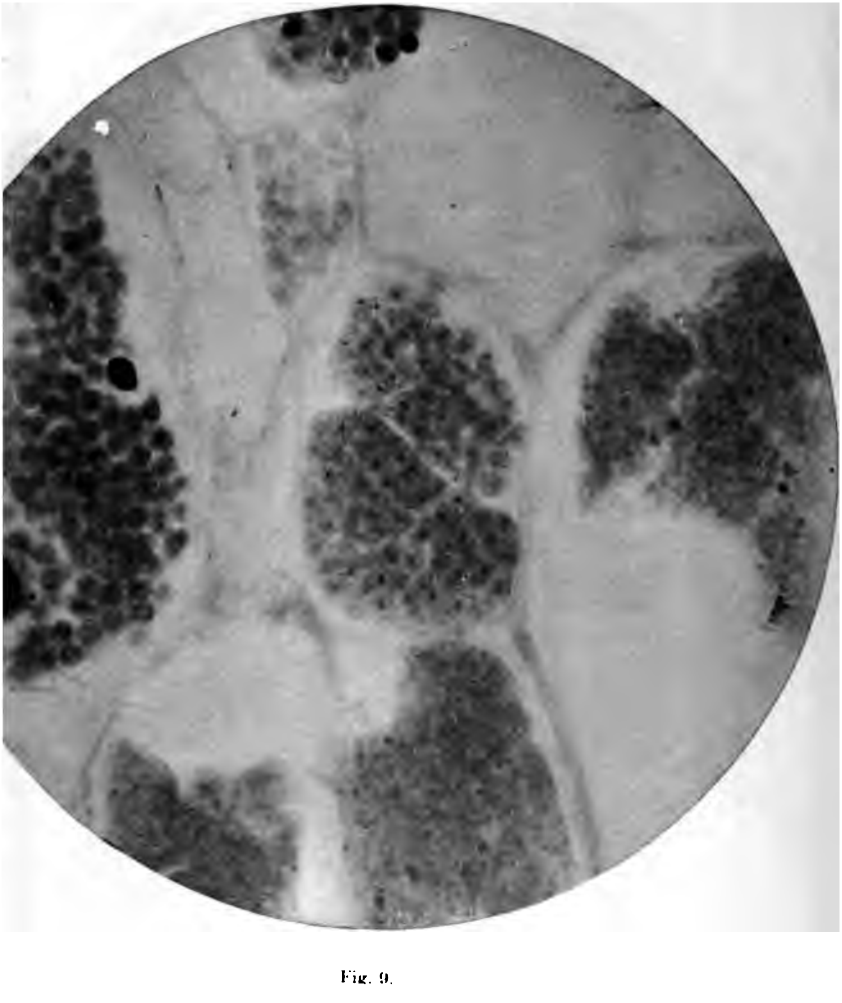

Fig. 9.

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TILDEN FOUNDATIONS.

PLATE X

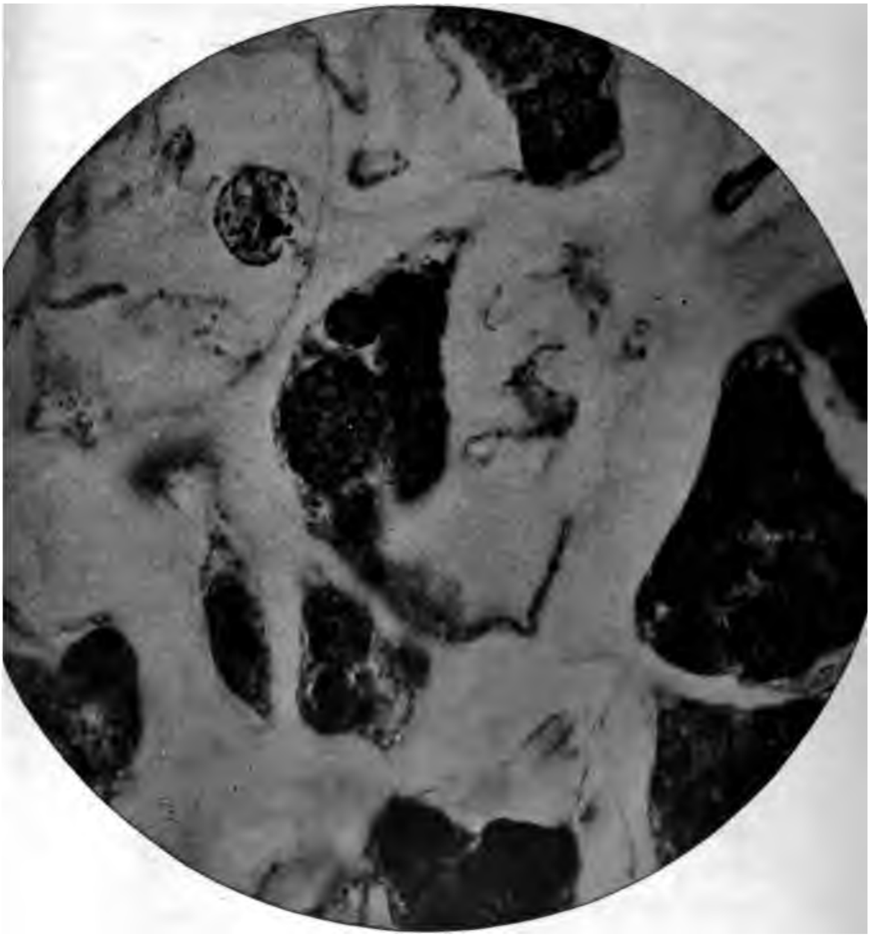

Fig. 10.

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rule, poorly developed, in many cases scarcely distinguish-le, in which case the nucleus presents the appearance of vacuole in the protoplasm containing a highly refractive ntral body. Many of the cells are completely filled with osely packed amœbæ, in which case the cell protoplasm practically obliterated. The infected cells lie in groups, as escribed by Nawaschin, but these groups are usually surrounded hypertrophic plant cells containing no parasites. The nuclei the plant cells are readily distinguishable from the amœbæ, easuring on the average 10 to 12 micromillimeters in diameter. he amœbæ vary in size, the smaller measuring 4 or 5 micro-illimeters, the larger 18 or 20 micromillimeters in their greatest ameter. The form of the amœbæ varies within wide limits, it the predominating form is oval or spherical. We have unted as many as 20 nuclei in one section of an amœba.

In the material thus far examined we have been unable to col-ct all the different forms described by Nawaschin, as evidence nuclear division of the amœbæ, but divided central bodies th the grains of chromatin arranged in the plane of division e not infrequent. For this purpose young roots are required. e phases leading to spore formation are more readily discern-le. Large amœbæ in which the nuclei are indistinct are ex-emely frequent. The outline of the amœbæ in this stage comes indistinct (Fig. 9) and those adjacent to each other alesce. Many of the cells are filled with granular masses of otoplasm nearly or completely filling the entire cell (plas-odia). (Fig. 9.) The nuclei of these masses of protoplasm, hich are scarcely discernible, then divide by a process of regular aryokinesis, so that large masses are found filled with achro-atic spindles, with well-defined medullary plates. At this stage e entire mass of protoplasm divides into irregularly shaped its surrounding the spindles, and these, according to Nawas-in, by a process of condensation form the spherical spores.

Infection of animals with Plasmodiophora.— Having deter-ned the appearance of the spores, amœboid and plasmodial rms of the organism within the plant, both in the fresh state d in hardened sections, we have undertaken to repeat the experiments of Behla and Podwyssozki by implanting fragments of the tumor-like outgrowths of the infected roots beneath the subcutaneous tissue and into the peritoneal cavities of cold and warm-blooded animals. For this purpose we have employed guinea-pigs, rabbits, a few white rats and frogs.

The method of procedure was as follows: Fresh clubroot immediately after removal from the ground was washed for a period of time in running water, then carefully scrubbed with a brush to remove the dirt, after which it was thoroughly scrubbed in a 1:2000 sublimate solution, then thoroughly washed in sterile water. Observing the usual antiseptic precautions, sections of the tumor-like outgrowths 8 or 10 mm. in thickness were cut from the root, and with a sterile canula disks were punched from the cortical portion of the outgrowth, in each case avoiding the periphery. A slight incision was made through the skin in guinea-pigs and rabbits, the canula was introduced, the disk of clubroot pushed from the canula into the integument and the wound closed.

In all of the animals thus treated the wound healed rapidly without suppuration, except in a few cases where the clubroot was not sufficiently disinfected and bacteria were introduced. Where infection did not occur the results were uniform, whether the implantation was made in guinea-pigs or rabbits. In each case microscopic examination was made of the fresh material before implantation. Several animals were inoculated with very young outgrowths, the tissue of which, when examined with the microscope, showed only the presence of amœbæ within the plant cells, and in these cases *no infection resulted.* In the remaining experiments the microscopic examination showed the presence of many spores of the organism, which were likewise readily detected in the fragments of plant tissue remaining after removal from the animal at the termination of the experiment.

In all of these experiments there developed at the site of implantation a distinct tumor, which increased in size for a period of from four to six weeks, at which time they were usually the size of a hazelnut. From the sixth week on the tumors gradually decreased in size, and at the end of three months the site of the mplantation was marked only by a small mass of connective issue or had totally disappeared. The microscopic appearance f the fresh tumors during the stage of progression, i. e., to six reeks, was found on removal to consist of the remains of the mplanted vegetable tissue surrounded by pinkish-white granulaion tissue constituting the tumor. Scrapings from the cut surace of the tumor, avoiding the plant tissue, showed that the rowth is composed of large cells of connective tissue or endohelial origin. These cells possess large vesicular nuclei containng one or more nucleoli. An occasional cell is met in which the ucleus is in some stage of karyokinesis. These large cells can e readily detected by numbers of minute, highly refractive fat roplets embedded in the protoplasm. Under high power, besides he nucleus the large phagocytic elements are found to contain rithin their protoplasm numbers of cell inclusions presenting the ppearance of vacuoles containing central bodies. Each cell sually contains several of these inclusions, and in some cases he protoplasm is closely packed with the inclusions and fat roplets. Numbers of the inclusions present the appearance of he spores of Plasmodiophora when examined in the fresh state, e., spherical, greenish-yellow bodies of high refractive index, rith a highly refractive central body. The derivation of the inlusions first mentioned from the typical spores of the organism an be readily traced. In the younger tumors the fresh scrapngs show the presence of large numbers of leucocytes. Careful xamination of the leucocytes shows that spores or inclusions rithin the leucocytes are extremely rare. In only one case have e found a spore within a leucocyte.

Sections through the surrounding tissue and the implanted egetable tissue were hardened in sublimate, formalin and Heriann's fluid. Preparations hardened in Hermann and stained ith Plimmer's method gave the most satisfactory results. An xamination of growths of ten days or under, reveal the followig relations: The outline of the plant structure is well prerved, and the relations of the contained spores and the remains f the amœbæ can be easily determined. At the margins the lant tissue is surrounded by a mass of coarse granulation tissue, more or less densely mixed with polymorph nuclear leucocytes. In uninfected cases the leucocytes are seldom present after the twelfth day, as pointed out by Podwyssozki. An examination of the plant tissue reveals the spores intact within the infected cells. In preparations from which the osmic acid has not been removed the spore presents a characteristic appearance. Instead of the diffused blackening which characterizes the spore in the fresh state, in many spores the fat is gathered together in globules at the center. (See Fig. 11.) At the margin of the plant tissue the spores can be traced for a certain distance into the granulation tissue by the blackened droplets of fat which they contain. It is evident by studying the margin of the preparation that the spores rapidly lose their fat, whereupon they can no longer be distinguished in preparations stained with safranin. In preparations from which the osmic acid has been removed and the section stained with iron hæmatoxylin and neutral red (Plimmer's method) the chromatin of the spores stains a blue-black, and in the spores remaining in the plant tissue is irregularly arranged near the center of the spore. At the margins of the plant tissue the spores can be detected in the elements of the granulation tissue surrounding it. This tissue is made up of large connective tissue phagocytes with vesicular nuclei of varying size. The nuclei stain deeply and contain one or more nucleoli. The protoplasm is finely granular. In these cells the spores of the organism can be demonstrated, although in preparations from the tenth day on many show marked alterations in appearance. In early implantations the spores are readily recognizable, still containing chromatin and presenting the appearance found in the spores included in the plant tissue. The large phagocytic cells contain usually one or more. In some cases the protoplasm is filled with closely packed spores. In tumors from the twelfth day on many of the spores within the cells are found to have increased in size. The chromatin is usually absent and the protoplasm is contracted in the form of a central body surrounded by a clear space. (Figs. 12 and 13.) The periphery of the spore is indistinguishable from the protoplasm of the cell containing it, and the whole presents an appearance closely resembling certain cell inclusions in cancer.

Plate XI

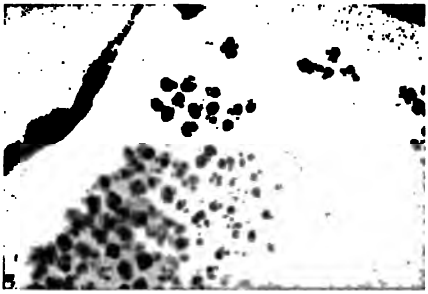

Fig. 11.

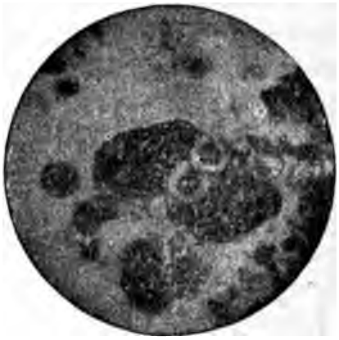

Fig. 12.

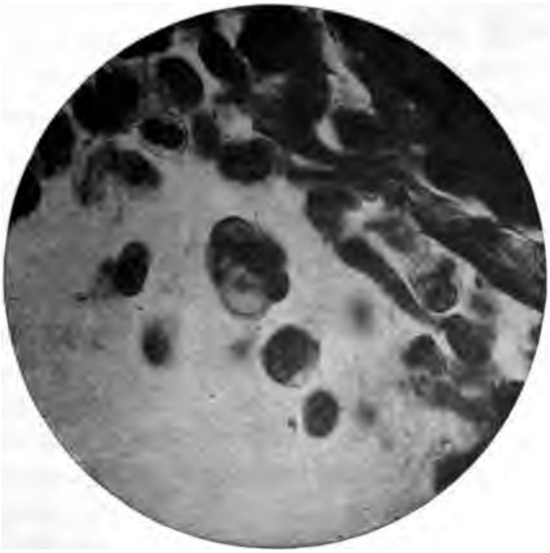

Fig. 13.

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ndition of the amœbæ within the plant tissue after im-
n in the subcutaneous connective tissue of animals is
f especial attention. *In all preparations we have found*
imoebae and all forms of the parasite, with the exception
pores, *have disintegrated.* The site of these forms is
by masses of disintegrated protoplasm and chromatic
. By a careful comparison of portions of the plant tissue
ase before implantation, we have been able to determine
is actually what occurs. The infection of the surround-
es is therefore owing to the presence of the spores, and
bæ are undoubtedly incapable of producing infection.
hown by the cases in which we implanted fragments of
ubroot in which the organism had not reached the stage
formation. In all of these experiments the fragment of
sue acted simply as a foreign body in the tissue, and
usual period disintegrated and was removed. Macro-
y these cases could be readily distinguished from those
the plant tissue contained spores, in which case granula-
ors the size of a hazelnut invariably developed. It is
robable in this case that the amoebae perished with the
l, in which case the smybiosis referred to by Nawaschin
ently complete.

dules which result from the infection of warm-blooded
by the spores of Plasmodiophora disappear in a period
from six weeks to three months. They are therefore not
it, the organism being ultimately destroyed by the ac-
the cells in which they are found.

cond series of experiments, in which we employed frogs,
d even more definite characteristics than those found in
oded animals. In these experiments the necessity for
ng the introduction of bacteria was not as great as in
n-blooded animals. The frog is apparently capable of
ng bacterial infection with readiness. In these experi-
e clubroot was ground in a mortar in sterile salt solution.
termining that spores were present in the material it
ined through cheese-cloth to remove the coarse fragments
and then injected into the peritoneal cavity with a

hypodermic syringe. Frogs examined at the end of seven to ten days show upon the surface of the peritoneum, especially in the omentum, whitish firm nodules, varying in size from a pinhead to a grain of rice and larger. In some cases the omentum is thickly infiltrated with larger and smaller nodules. Teased preparations from these nodules and scrapings show that they are composed of large endothelial cells containing spores of Plasmodiophora, and in scrapings made from the periphery of the nodules large numbers of coarsely granulated elements can be found. In frogs killed after the fifteenth day the granulated cells are greatly decreased in number. The granulated cells were never found to contain the spores of the organisms. The nodules were hardened in formalin, sublimate and Hermann's fluid. Preparations hardened in sublimate and Hermann were best suited for the investigation of the spores, which in the formalin preparations were scarcely distinguishable. In sections hardened in sublimate and stained with hæmatoxylin-eosin the structure of the nodules is well-defined. It consists of accumulations of large cells with large vesicular nuclei of varying shapes. Many of the cells are oval, the majority are fusiform. (Fig. 14.) They are closely packed and in many cases arranged about centers, presenting an appearance not unlike the pseudopearls or whorls found in certain endotheliomata. (Fig. 15.) The nuclei are rich in chromatin; the cell protoplasm stains readily with eosin. On the surface of the smaller nodules which lie directly beneath the peritoneum the superficial endothelium can be readily distinguished from the cells of the nodules. The nodules frequently lie in the neighborhood of blood vessels, and from their relation have apparently developed in the sub-peritoneal lymph spaces. About the margins of the nodules the connective tissue stroma is densely infiltrated with polynuclear eosinophiles. (Fig. 16.) The cells forming the nodules can be readily distinguished in the connective tissue cells of the stroma. At the margins of the larger nodules the cells forming them penetrate into the surrounding stroma, in which they form cell nests sharply delimited from the surrounding connective tissue. Frequent karyokinetic figures are found within the nodules which

PLATE XII

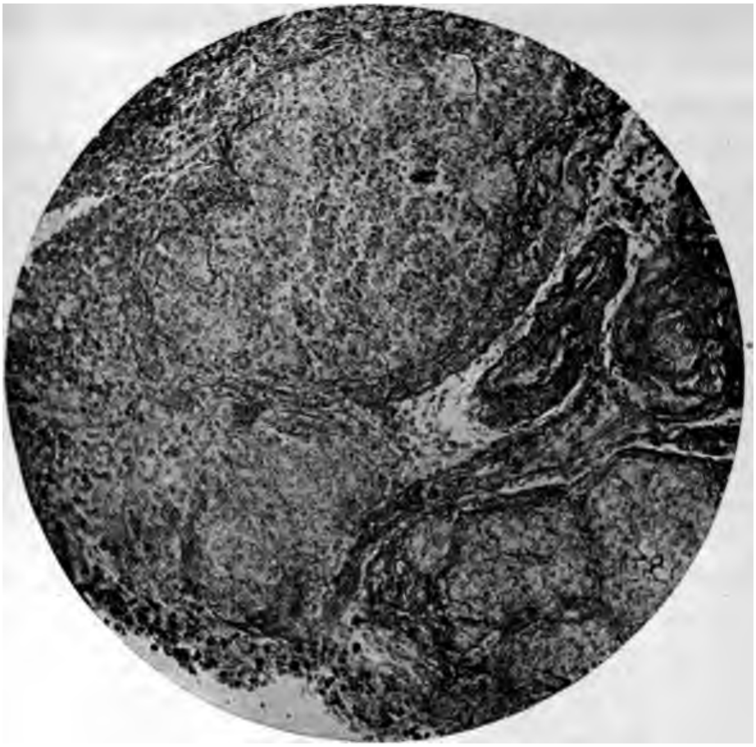

Fig. 14.

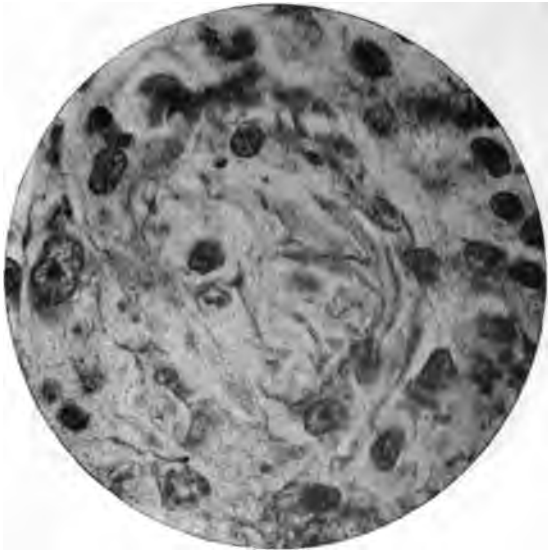

Fig. 15.

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PLATE XIII

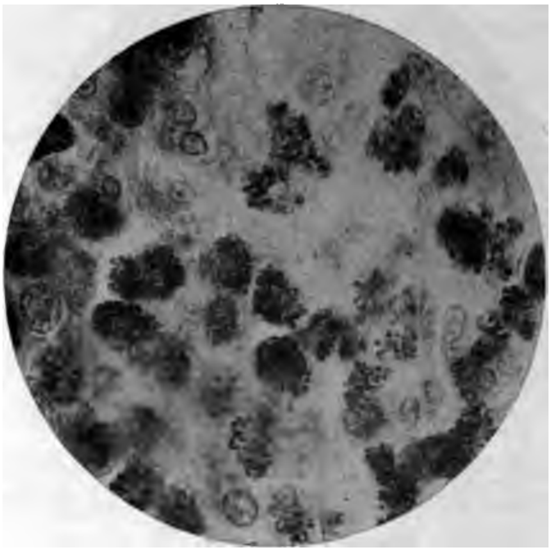

Fig. 16.

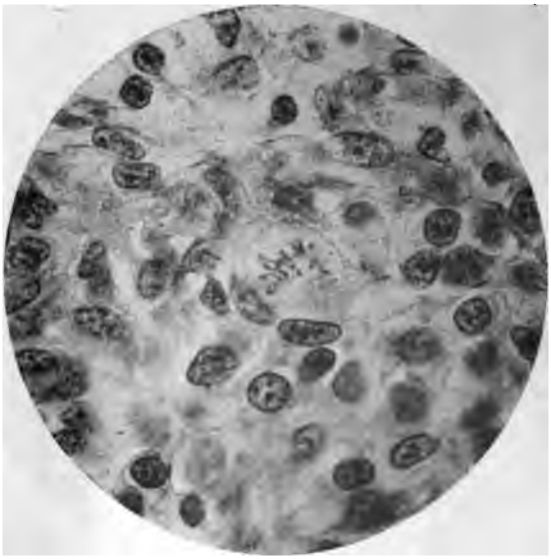

Fig. 17.

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ASTOR, LENOX AND
TILDEN FOUNDATIONS.

PLATE XIV

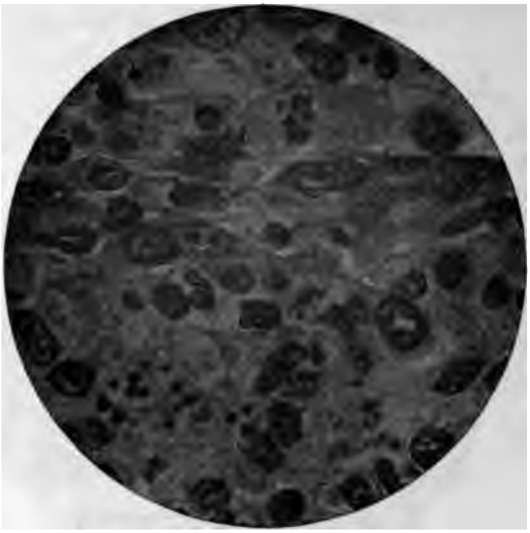

Fig. 18.

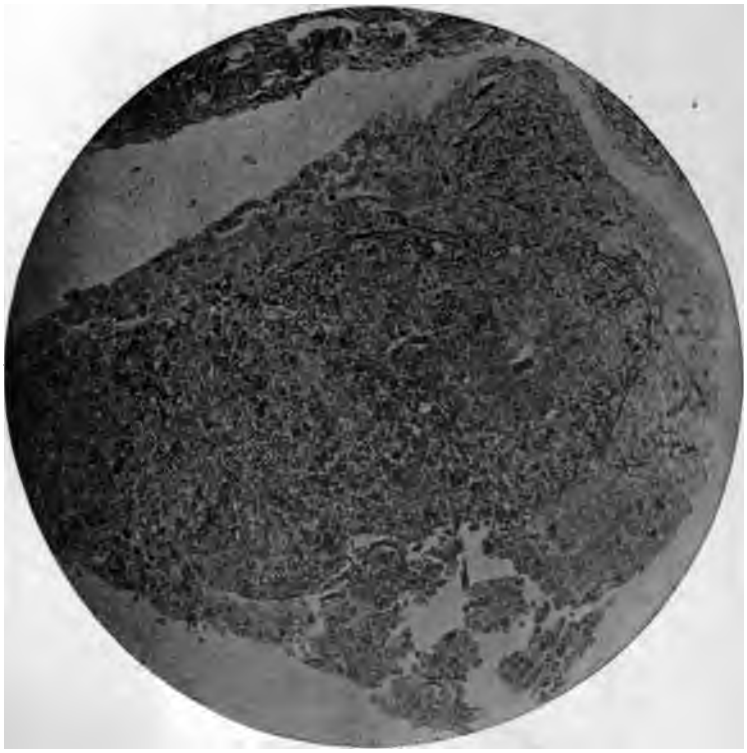

Fig. [illegible]

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PLATE XV

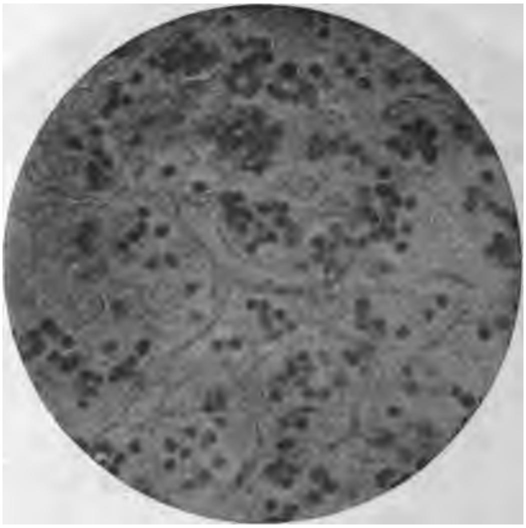

Fig. 20.

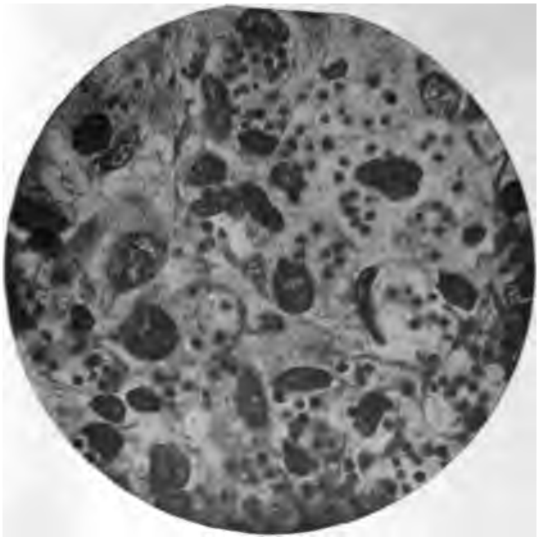

Fig. 21.

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PLATE XVI

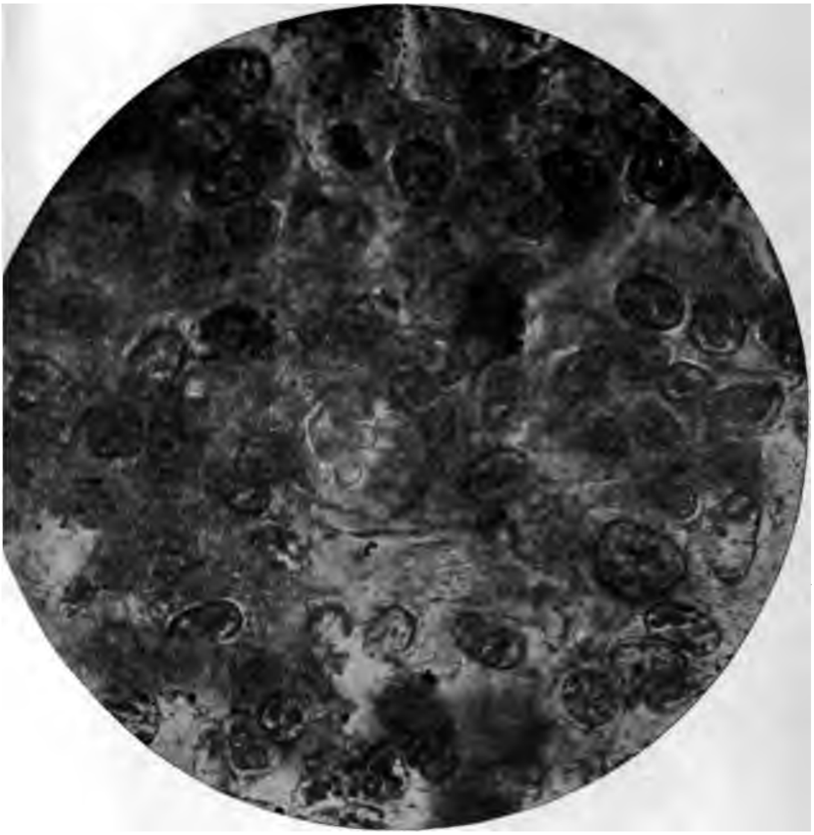


Fig. 22.

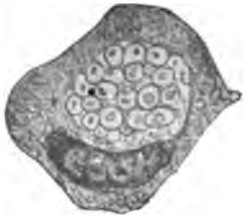


Fig. 23

AND
DATIONS.

PLATE XVII

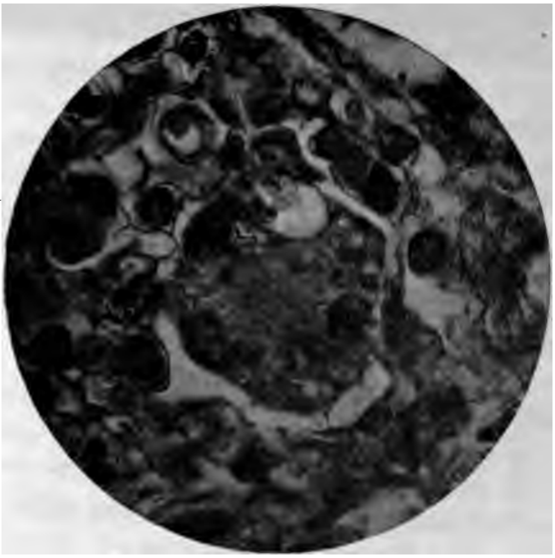
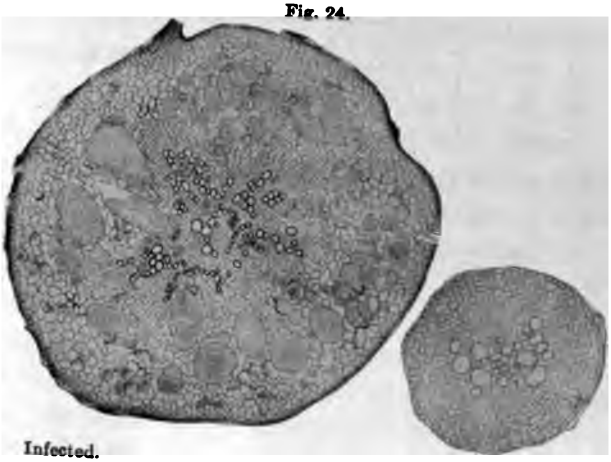


Fig. 24.



Infected.

Fig. 25, after Woronin.

Normal.

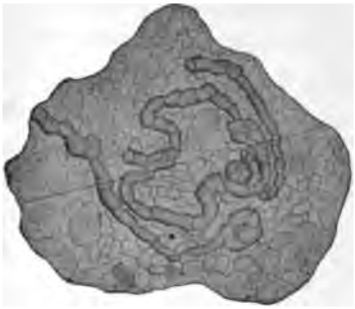


Fig. 26.

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TILDEN FOUNDATIONS.

have never been detected in the surrounding connective tissue. (Figs. 17 and 18.) In preparations stained with hæmatoxylin-eosin the spores of Plasmodiophora are scarcely discernible. The protoplasm of the cells at the centres of the nodules presents a coarse granular appearance, and is apparently filled with rounded bodies of indefinite form which occasionally stain a pale rose tinge with hæmatoxylin. As will be seen by the further examination of preparations, these bodies are the spores of Plasmodiophora. In formalin preparations the spores are still more poorly defined and would undoubtedly escape notice. It is probable that by the use of this fixative Behla failed to detect the spores of the organism in infected cells.

In sections from material hardened in osmic acid, from which the osmic acid has not been removed, counterstained with saffranin, the spores of the organism within the cells of the nodules can readily be detected as blackened, spherical bodies, approximately three micromillimeters in diameter. Under low power (see Fig. 19) the spores present the appearance of fat droplets blackened in the usual way by the osmic acid within the cells. They are most densely arranged at the centers of the nodules, the cells at the periphery containing a fewer number of spores than those forming the center. Under high power (Fig. 20) the fat is found to be most densely arranged about the periphery of the spore, and many spores are found which apparently contain no fat whatever. These shadowy forms, many of which apparently contain no internal structure, look like minute shadowy red blood corpuscles. In preparations hardened in sublimate and stained with Plimmer's method the picture presented is similar to that found in the hæmatoxylin-eosin preparations, with the exception that the nuclei are more sharply defined and many of the spores are found to contain chromatin. The differentiation of the cells of the nodules from the subperitoneal connective tissue stroma is more sharply defined. Karyokinetic figures are likewise more pregnantly stained and are found to be quite numerous. The characteristic nest-like arrangement of the endothelial cells is likewise clearly defined. (Fig. 14.) The granules of the eosinophiles of these preparations are capriciously stained, in many cells unstained, in others distinctly blue. The finer structures of the spores are best observed in preparations hardened in Hermann's fluid and stained with iron hæmatoxylin and neutral red. (Fig. 21.) In these sections it can be seen that many of the spores have lost their chromatin, while the majority possess an irregular chromatic structure at the center of the spore separated from the delimiting capsule by a narrow space. Many of the spores are entirely free from chromatin, and in some the chromatin is arranged about the periphery of the spores in the form of fine granules of uniform size. In a few cells we have seen structures of approximately five micromillimeters in diameter sharply defined from the protoplasm of the cell, containing uniform granules, staining deeply with the nuclear stain. These forms are rare and we believe them to be derived from the spores. Whether they represent a stage of further development or retrograde changes in the spores it is impossible to determine. Free chromatin granules of this type are likewise occasionally encountered, especially about the peripheries of the nodules. Occasionally spores are encountered which have increased in size, which are free from chromatic material, with an irregular, or spherical central body, again presenting an appearance closely resembling the cell inclusions of carcinoma. The granules of the granulated cells in these sections stain deeply with the iron hæmatoxylin. It is difficult to determine in many cases whether one is dealing with the minute spherical elements apparently derived from the spores, or free granules from these cells. In regions in which the granulated cells are abundant the differentiation is often impossible. A few sublimate sections were stained with Biondi-Heidenhain for the purpose of determining the affinity of the granules of these cells, which were found to stain a brilliant orange. A certain number of the larger endothelial cells near the centers of the nodules were found to contain great numbers of spores. In many cases their protoplasm was greatly distended and the spores were closely packed in large vacuoles, presenting an appearance not unlike a cyst filled with spores. Fig. 22 represents a cell of this description from a section stained with Biondi-Heidenhain. The appearance of the spores in these cells is so like illustrations in the recent publication of von Leyden of inclusions found in carcinoma of the lung that the two should be viewed together. (Fig. 23.) The tendency of the cells of the nodules to coalesce often leads to the formation of giant cells. In one of our preparations giant cells with the spores arranged about the nuclei were occasionally encountered. The relation of the spores to the nuclei of the cells is often of interest. *In many cases, especially in the smaller cells composing the nodules, the nucleus of the cell will be found to be pushed to one side and curved about the spore, giving it an appearance closely representing certain illustrations of centrosomes.* In the giant cells the spores are commonly arranged about the nuclei, the center of the giant cell being free. (Fig. 24.) In sections stained with Mallory's connective tissue stain the cells of the nodules stain a brilliant red or orange, whereas the connective tissue stroma stains a brilliant blue. Fine fibres of connective tissue can be found extending into the smaller nodules, but the larger nodules are, for the most part, free from stroma, except about the margins where the cells of the nodules infiltrate the surrounding connective tissue structure from which they are sharply defined.

Frog III, killed after 47 days, shows upon the surface of the liver, the mesentery and omentum, nodules varying from the size of a pinhead to that of a large grain of rice. These are firm and white and of a little greater consistence than those found in Frog I. Fresh examination shows these nodules to be composed for the most part of large, spindle elements in which an occasional vesicular structure, varying in size from three to six micromillimeters, can be found. Many of these vesicular structures contain central bodies which are undoubtedly spores of Plasmodiophora. In sections hardened in sublimate and stained with hæmatoxylin-eosin the tissue of the nodule is found to be composed of large spindle elements with vesicular nuclei. Viewed under low power these cells are seen to be arranged about centers, presenting an appearance like the whorls of cells found in certain sarcomata. Occasional giant cells are present, measuring as high as 30 micromillimeters in greatest diameter. These contain many nuclei, as many as 18 or 20 being counted in one cell. These are usually arranged about the periphery of the cell or in a group at the center. Careful examination of the preparation for spores shows that occasional cells contain shadowy spherical bodies, usually without other structure, but occasionally with a central body. Many of these spores are as large as six micromillimeters and present the characteristics of intracellular inclusions found in carcinoma. Occasionally a granulated cell can be found at the margin of the nodules. The cells of the nodules do not stain as deeply as those of Frog I, and the intracellular connective tissue stroma is more prominent. Embedded in one of these nodules are two cystic structures of spherical outline measuring eight micromillimeters in diameter. Their margins present a beaded or radiating appearance, and each contains a mass of unstained protoplasm of irregular form, nearly filling the cyst cavity. The appearance of these structures is so striking as to leave absolutely no doubt that they *represent the spore cysts of Plasmodiophora with well-developed swarm spores within them.*

From these experiments it will be seen that the spores of Plasmodiophora, when injected into animals, are capable of causing granulomata composed largely of endothelial cells which present certain characteristics distinguishing them from the ordinary infectious granulomata, and which give them an appearance more closely resembling endothelioma and sarcoma than the granulomata usually encountered. From a careful survey of our preparations we are able to confirm the conclusions of Podwyssozki given on page 27, and further to add that the observation in Frog III of perfectly developed spore cysts inclosing what seem to be well-developed swarmers shows that the organism is capable of development to this stage within the tissues of cold-blooded animals. These nodules, as stated by Podwyssozki, ultimately subside and resemble endotheliomata only in their histological characteristics. The spores, both in warm and cold-blooded animals, undergo certain alterations in the tissue, after which they closely resemble certain of the bird's-eye inclusions in malignant tumors.

The large numbers of eosinophiles noted about and in the nodules in the animals infected with spores of Plasmodiophora call to mind the similar accumulations found in the lymphomata of Hodgkin's disease. The spores of Plasmodiophora in the tissues of both warm and cold-blooded animals correspond in size and appearance very closely to certain structures described by Flexner* in lympho-sarcoma which he suggested were protozoa. It is possible that a further investigation of Plasmodiophora and allied organisms may throw light on the nature of the spherical bodies described by the above author.

The analogy between clubroot and cancer.— The application of the facts pertaining to the distribution of the amœboid form of Plasmodiophora in clubroot, as determined by Nawaschin, to the nature of the proliferation of the cancerous epithelium as it is now understood in man, reveals the following status: The outgrowths of clubroot are the result of proliferation and hypertrophy of the cells of the cortex. The cells of the medullary portion of the plant are never infected. Inasmuch as the infection of the plant can occur during any stage of its development, this must be attributed to a selective faculty on the part of the swarm spores at the time of their entry into the plant tissue. Examination of sections of yound clubroot in which the amœboid is the predominating form of the organism discloses the characteristic arrangement of the infected cells as pointed out by Nawaschin. A similar distribution can be found in the beautiful illustrations of Woronin. (Fig. 25.) The infected cells are in every case arranged in groups, and serial sections show that each infected cell is at some point adjacent to another infected cell, the whole group surrounded by hypertrophic cells in which no parasites are to be found. This peculiar arrangement of the cells and the fact that the amœbæ have never been detected in the act of penetrating the wall pits of the cells has led Nawaschin to the conclusion that the *distribution of the parasites is owing exclusively to the proliferation of one or more primarily infected cells.* That he has found dividing plant cells containing amœbæ and that the amœbæ are in this way distributed is beyond doubt. The distribution of the groups of infected cells throughout the cortex is undoubtedly the result of multiple infection. An examination of the hypertrophic cells of the cortex surrounding the groups of infected cells, but free from parasites, reveals the presence of an occasional karyokinetic figure. From this it would seem that the amœbæ, themselves incapable of penetrating from one cell to another, liberate some soluble toxic substance which, diffusing into the surrounding cells of the cortex, leads to hypertrophy and occasionally to proliferation. This toxic agent, whatever its nature, is likewise capable of causing proliferation of the cells forming the vessels of the plant, which in some cases proliferate to such an extent that in the neighborhood of the infected cells they are frequently tortuous, coiled and otherwise distorted. This condition is admirably shown in Fig. 26, from Woronin. In no case have parasites been found within the cells of the vessels. On examination of sections of clubroot in which the amœbæ have passed through the plasmodial phase terminating in spore formation, it will be noted that the hypertrophic character of the surrounding parenchyma cells has largely disappeared. It would thus seem that the toxic action of the parasite is confined to the vegetative stage. The proliferation of the cells in the tumor can therefore be divided into two classes: first, infected cells; the stimulus for the division in this case is probably toxic, but the proliferation is no doubt for the purpose of throwing off the parasite, which is seldom successful, as the amœbæ proliferate much more rapidly than the host cell, and by the time the process of proliferation is terminated in the plant element, the entire cell being filled with amœbæ, a certain number remain in each of the daughter cells formed by the division. The second order of proliferation is that affecting the surrounding structures. This is purely toxic and appears to subside when the proliferative phase of the organism terminates. This affects the adjacent cells of the cortex and the cells of the vascular system. If fragments of clubroot containing amœbæ are transplanted upon the cortex of an uninfected plant of the same variety, a tumor will develop which is the result of proliferation of the infected transplanted cells, combined with hypertrophy and a certain amount of proliferation in the surrounding parenchyma cells of the plant upon which the infected cells have been implanted. There is no doubt whatever, if cells of the tumor in the first case could be selected which contained no parasites, no tumor formation would result in the inoculated plant. It will thus be seen that in order to produce clubroot by inoculation infected cells must be transplanted. In this case likewise both cells and parasite must be transplanted intact. Attempts to produce inoculation tumors in plants with the amœbæ alone have thus far proved negative, and so far as our present knowledge extends, a primary infection can only be induced by the introduction of the flagellate form of the organism after the germination of the spores in the earth. The endothelial connective tissue tumors which result in animals from the implantation or inoculation of the spore form of Plasmodiophora from the plant, are probably largely the result of toxic substances contained within the spore, acting upon the cells of the animal. The transient leucocytosis likewise strongly suggests this explanation. As the organism is incapable of accomplishing a reproductive cycle when implanted under these conditions, the process is not progressive, although the spores are found shortly after implantation embedded in the cells which have proliferated about them.

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* Multiple lympho-sarcomata, with a report of two cases. A contribution to the infectious nature of lympho-sarcoma. *The Johns Hopkins Hospital Reports*, Vol. III, 1894, p. 153.

The frequent occurrence of karyokinetic figures in the cells of the animal forming these tumors indicates that the mere presence of the spores is capable of inducing proliferation of certain elements in the animal. It must be noted that this toxic activity of the spores is exerted in a selective way. The cells surrounding the implanted spores, with the exception of the primary (transient leucocytosis) are all of one character and apparently derived from one source. Instead of a heterogeneous mixture of elements, such as we find in granulation tissue, these nodules are all of the same type, and in the frog present an appearance in the progressive stage closely resembling endothelioma.

If in the light of the ascertained facts governing the relation between Plasmodiophora and the plant cell, as above stated, we turn to the conditions as we find them in cancer in man and animals, a series of analogies can be developed which indicate that in Plasmodiophora we have a parasite, the cause of a specific tumor, which in its relation to the tissue which it infects fulfills many of the conditions which must be required of a parasite before it can be accepted as bearing a direct etiologic relation to cancer. The investigations of Hauser, Peterson and others have demonstrated that in primary epithelial growths a direct continuity with the epithelium from which the tumor is derived can be readily traced. This has been accomplished by means of serial sections and wax models. These investigations have likewise shown, especially in epithelioma, a form of tumor which has been most frequently subjected to this form of examination, that the proliferation frequently begins at several points, as a rule not far distant from one another. Starting at these points the tumor spreads into the surrounding structure and through the medium of the lymph spaces, carcinomatous cells are carried into the circulation, when the phenomenon of metastasis formation supervenes.

Associated with the proliferation of the epithelium is with rare exceptions a reaction of the adjacent connective tissue. This is evidenced by the well-known round celled infiltration at the margins of many carcinomata, by the extensive development of a connective tissue stroma and by the frequent appearance of karyokinetic figures in the nuclei of the connective tissue elements forming it. The evidences of mitosis in the stroma of the tumor are never so frequent as in the proliferating epithelium of the tumor proper. The structure of the newly formed stroma of the tumor likewise includes a more or less well-developed vascular system. That the specific factor of the tumor formation is not in the stroma is evidenced by the fact that metastatic connective tissue proliferation is not a phenomenon of the dissemination of carcinoma. On the other hand, in the regions where metastases from the primary tumor develop without regard to the tissue or organ in which this occurs a stroma derived from the adjacent connective tissue results from the presence of the epithelial elements of the tumor. It is thus seen that the epithelial elements carry with them and elaborate some agent capable of inducing not only the primary reaction of the connective tissue as expressed by the frequent round-celled infiltration at the margin, but an extensive proliferation of the connective tissue structure which, both in the primary tumor and in the metastases, leads to the development of a more or less well-defined connective tissue frame-work which forms no inconsiderable proportion of the new growth. It is generally conceded that the cells of carcinoma in a given case are derived by proliferation from groups of cells which have primarily undergone the cancerous transformation. In most cases the cell, once so transformed, proliferates indefinitely, and transported through the medium of the circulation to other regions of the economy, continues its proliferative activity, and in this way the metastases are formed.

It is, however, a well-known fact that every cancer cell is not capable of proliferating indefinitely. This is first shown by the large number of cells which present high grade degenerative changes, in many cases the forerunners of complete disintegration. It has likewise been noted that all tumor elements are not capable of producing metastases, even when transported under exactly the conditions ordinarily leading to this result. For instance, cancer cells have frequently been found in the pulmonary capillaries and in the ductus thoracicus, regions in which metastases frequently develop, but which show no evidence of proliferation, although present in large numbers. It will thus be seen that every cancer cell is not capable of continuing indefinitely the cancerous process.

Inasmuch as in clubroot we have no metastases, the outgrowths in this case could at best only be compared with the primary tumor in cancer. We have seen that the tumor in clubroot is composed of cells containing parasites and hypertrophic cells immediately adjoining them. The infected cells when transplanted are capable of continuing the growth. The hypertrophic cells, which in all other respects closely resemble them, but which contain no parasites, are naturally incapable of producing an infection. We have seen, by analysis, that the primary growth in cancer presents a certain analogy in that it is composed of cells capable of continuing the proliferation when transported to distant regions, and other cells which morphologically closely resemble them, which are incapable of producing metastases. *For this reason we must conclude that if a parasite were the basis of the cancerous proliferation, it would not necessarily be present in every epithelial cell forming the tumor.* It must necessarily be seen that the cells which are incapable of continuing proliferation must either contain no parasites or have reached a stage in which it is itself incapable of further proliferation, in which case the organism has in all probability passed into some permanent spore-like form, a condition in which it would be incapable of reinfecting epithelium or other cells of the organism without passing through some ectogenous cycle of development. This is exactly the case in Plasmodiophora, and it may be pointed out that cell inclusions in cancer, which are held by certain investigators to be of parasitic nature, are not present in all the cells even when most frequent. To this must be added, however, that the inclusions in cancer which so closely resemble the amoeboid form of Plasmodiophora at best represent but one form of the parasite; that at least occasional spores must be accounted for, and that the organism on its entry into the epithelium is probably present in some form which, with our present methods, we are unable to recognize. The fact that the swarm spores of Plasmodiophora when injected into the tissue, so closely approximate in their appearance certain normal tissue elements that they are unrecognizable, indicates that such a supposition is reasonable.

As the specific factor in cancer, having once developed in certain cells, remains identified with them, being handed down through proliferation of these cells, it must greatly increase in amount. It has been suggested that this specific factor is of a toxic nature, but no explanation has been offered as to how a small amount of toxin, starting in a few cells, can continually reproduce itself. From what we know at present of toxins there is absolutely no ground for this supposition, and even in the case of enzymes or ferments, which are sometimes referred to, we have nothing analogous to the conditions in cancer. There is no doubt that the development of the stroma in cancer must be attributed to the action of a toxin, since this action is local and undoubtedly results from the presence of the cancer cells, but inasmuch as the mere proliferation of normal cells does not lead to the elaboration of a toxic substance, we must assume that this toxic substance is directly associated with the essential factor which causes the cancerous transformation of the epithelium. As the essential factor in cancer increases with the proliferation of the cells, or in other words, reproduces itself, and we know that no toxin is capable of this, we arrive at the conclusion that the presence of an organism in the epithelium offers the best explanation of the phenomena as they occur. An organism of the protozoan group, especially one more or less distantly related to the Mycetozoa, and therefore comparable to Plasmodiophora, would best fulfill these conditions. That such organisms upon infecting the tissue elements of a higher animal do, in all probability, elaborate toxic substances is shown by the facts in Plasmodiophora. A similar state of affairs has been described by Pianese, who observed atypical karyokinetic figures in the epithelial cells of the urinary tubules of the guinea-pig which were infected by a protozoan parasite.

We have seen that in Plasmodiophora the parasite divides until the demands upon the cell are such that it likewise divides. This continues until by repeated divisions the parasite has completely filled the cell and exhausted the nourishment, whereupon the organisms are transformed into permanent spores. These spores are incapable of reinfecting the cells of the plant until they have passed through the ectogenous cycle, in which they lie during the entire winter in the ground, liberating swarm spores with the advent of spring, which, entering fresh plants, leads to reappearance of the disease.

The infection in Plasmodiophora destroys the growth of the plant, and in a certain sense may be looked upon as a malignant infection. It is seen that the organism remains in the amœboid stage and in a state of symbiotic existence with the host cell until it is exhausted. This is dependent upon the relative rate of proliferation. It is possible to conceive that in cancer the greater proliferative power of the epithelial cell might place it on a footing with the parasite, which would enable it to proliferate rapidly and indefinitely, in which case only exceptionally unfavorable conditions would lead to the development of spores. These spores, even if present in the tissue, would be incapable of infecting uninfected cells without passing out of the organism and through some ectogenous cycle. They would likewise be incapable of infecting the tissue cells of other animals or individuals when transplanted without the interposition of this cycle, as is the case in Plasmodiophora.

The parasite, once having entered into this symbiotic relation with the cell, would perish with the cell unless it had taken on the permanent spore formation just mentioned. For this reason it would be impossible to produce tumors even in animals of the same type without the transplantation of both cell and parasite, which applies both to the transplantation experiments as carried on in animals and the relations as they exist in Plasmodiophora. The few cases in which inoculation of animals with peritoneal fluid from man has been followed by epithelial proliferation cannot be compared directly with the conditions as they occur in nature. In the first place, while these tumors closely resemble malignant epithelial tumors as we find them in man and animals, they have in no case proved truly malignant; have never led to metastasis, and have ultimately been overcome by the animal. They may fairly be compared to the endothelial nodules which develop in frogs around the implanted fragments of clubroot. The conditions in this case are entirely abnormal, and the organism at best passes through but a portion of the necessary cycle. The nodules obtained in the liver of a dog by intravenous injection of peritoneal fluid from cancer of the peritoneum in man indicate the correctness of this explanation of these rare occurrences.

In conclusion it may be fairly stated that there are inclusions in cancer which, viewed in the light of Plasmodiophora, are best explained as parasites; that a comparison of the conditions found in clubroot with those found in man show that we are now acquainted with a parasite capable in many ways of fulfilling the conditions required of a parasite for cancer. Our efforts should therefore be directed to the more accurate determination of the nature and distribution of this too little known class of organisms, and to the determination if possible of an ectogenous cycle for the parasite of cancer, which includes the possibility of an intermediary host.

February 1, 1903.

On the Evidence of Nuclear Division of Certain Cell Inclusions (Thoma, Sjöbring, Plimmer's Bodies) in Cancerous Epithelium.

By Harvey R. Gaylord, M. D.

Since the advent of cellular pathology the attention of investigators has been directed to certain bodies embedded in the cytoplasm of the cells of malignant tumors. The difficulty of determining the nature of these inclusions is well evidenced by the extensive literature pertaining to the subject, but which even to-day leaves the significance of at least a number of these structures in doubt.

The bodies with which we wish to deal in this paper are spherical or slightly oval structures, from .004 to .01 mm. in size, or in exceptional cases of still greater dimensions. They invariably contain a small body, usually centrally placed. With the exception of this central body the resting inclusions present an appearance not unlike that of a vacuole, as no structure other than the central body is demonstrable. The entire structure is embedded in the protoplasm of the cancer cells and, where the body is of greater dimension, the cell nucleus is commonly pushed to one side and curved about it. The staining reaction of these inclusions is dependent largely upon the fixative employed. In material hardened with formalin and stained with Delafield's or iron hæmatoxylin, the central bodies of a certain number of the inclusions take the nuclear stain. Where osmic acid is used as a fixative, in which case the inclusions are most definitely demonstrated, the central body of the inclusions stains as does the protoplasm. These bodies may be found unstained in fresh material directly after removal of the tumor.

Although, as will be seen from the historical review, these bodies have been repeatedly observed and in many cases accurately illustrated, they have in recent times through the exhaustive article of Plimmer attracted renewed interest. In several of the recent publications on the subject, the bodies have been spoken of as "Plimmer's bodies." Von Leyden, one of the most recent writers on the subject, has called attention to their similarity in appearance to the eye of a bird, for which reason they are coming more and more to be spoken of as "bird's-eye inclusions," a not inapt expression.

Historical.—On review of the literature it becomes evident that many observers have seen and illustrated the inclusions above described. As early as 1847, in the first volume of Virchow's Archiv, is found an article by Virchow, entitled "Zur Entwickelungsgeschichte des Krebses, nebst Bemerkungen über Fettbildung im thierischen Körper und pathologische Resorption," in which on Plate II, Fig. 5, the cells shown at *a, g, i, l, n* and *k* undoubtedly contain inclusions of this nature. It is interesting to note that the author represents cells in the fresh state. Virchow regarded these bodies as modifications of the nuclei of the cancer cells.[1]

In Vol. III of Virchow's Archiv (Die endogene Zellenbildung beim Krebs), Virchow further describes cell inclusions, of which those illustrated on Plate II, Figs. 2*c*, 4*a*, 2 and *d*, appear to represent bird's-eye inclusions, although the illustrations are not sufficiently characteristic to remove a possible doubt. (See Fig. 1.)

Soudakewitsch[2] in two articles published in 1892, gives repeated illustrations of these bodies. Plate V, Fig. 6, carcinoma of breast represents a body apparently undergoing division with four central bodies arranged in the form of a cross. Fig. 2. Plate VI, also carcinoma of the breast, shows multiple inclusions, the one above and to the right presenting a definite phase of division. (See Fig. 2.) Fig. 27, Plate VI, carcinoma of the breast, hardened in Fleming and stained with safranin, represents a resting body. Plate VII, Fig. 17, carcinoma of the pancreas, hardened with osmic acid and stained with hæmatoxylin, represents a rosette form. Fig. 19 represents a cell with multiple inclusions from the metastases of cancer of the pancreas. In a second article in August of the same year he describes further inclusions. That of Fig. 7, Plate XII, from a primary case of carcinoma of the pancreas, illustrates seven definite inclusions, with central bodies forming a rosette. (See Fig. 2.) Fig. 15, from a primary carcinoma of the liver, stained with osmic acid and hæmatoxylin, represents a group of these bodies, and in Fig. 17, a body undergoing division is represented from a carcinoma of the pancreas. (See Fig. 2.) Fig. 21 again represents a group of similar inclusions from a case of cancer of the liver.

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[1] The cell inclusions described by Langhans in *Deutsche Chirurgie von Billroth und Lücke*, 1886, in the epithelial cells of carcinoma of the glands of Kupfer, do not belong under this heading, although Lubarsch (*Pathologische Anatomie und Krebsforschung*) wishes so to classify them. The bodies described and illustrated by Langhans are round, well-defined bodies, from the size of a nucleus to that of a large vacuole. They were, however, filled with granular material and surrounded by deeply stained membranes. Many of them were drawn out in tubular or branching form. It will be seen that this description in no way conforms to that of the bird's-eye inclusions.

[2] Soudakewitsch.—Recherches sur le parasitisme intracellulaire, etc. *Annales de l'Institut Pasteur*, 1892, March 25, No. 3.

Sjöbring[1] gives a most accurate and consistent description of bird's-eye forms of inclusions. In Figs. 1, 12 and 14 he illustrates characteristic forms. (See Fig. 3.) Thoma[2] describes bodies somewhat similar to those of Sjöbring. His original article is unaccompanied by illustrations. Illustrations given in his Lehrbuch f. path. Anatomie, 1894, p. 169, leave some doubt as to their identity. Fig. *a* apparently represents a bird's-eye inclusion, and those shown in the large figure above likewise appear to be of this nature. Figs. *c* and *d* of this illustration, representing a form of division, do not coincide with any forms we have personally observed. (See Fig. 4.)

An investigator who undoubtedly observed these bodies was P. Foa.[3] (See Fig. 5.) In Figs. 2 and 16 of Plate II, and 13 of Plate III, this author illustrates these bodies from carcinoma of the breast. He also recognizes the identity of many of the bodies described by him and those of Soudakewitsch, just mentioned.

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[1] Sjöbring.— Ein parasitäre Protozoartiger Organismus in Carcinomen. *Fortschritte d. Medecin*, 1890, p. 529.

[2] Thoma.— Ueber eigenartige parasitäre Organismen in den Epithelzellen der Carcinome. *Fortschritte der Medecin*, 1889, p. 413.

[3] Foa.— Ueber den Krebsparasiten. *Cent. f. Bakteriologie*, Vol. XII, p. 185, 1892.

Kürsteiner[1] describes two cases of carcinoma, one villous carcinoma of the bladder, and the other papillary adenocarcinoma of the uterine mucosa, in which he found embedded in the cells spherical and oval bodies with well-defined central structures staining with eosin. His illustrations are all taken from a villous carcinoma of the bladder and leave no doubt that in Figs. 3, 4, 5, 6, 7 and 8, Plate XII, he was dealing with typical bird's-eye inclusions. (See Fig. 6.) Of interest are the large number of inclusions which Kürsteiner noted in certain cells of his preparations. In one cell he was able to count as many as *eighty inclusions*. He inclines to the belief that the inclusions may be parasites, but expresses himself with great caution.

Seegenbeck van Heukelom,[2] in an address before the 10th National Medical Congress in Berlin, 1890, describes the presence in carcinoma, including nearly every type, covering some 200 different cases of large and small spherical inclusions in carcinoma cells. These sometimes presented a double contour, appeared to be filled with protoplasm and presented a nuclear-like structure, which stained with carmine. Besides these so-called larger spheres he describes smaller ones, which he says were found embedded in the protoplasm and in the nuclei. They did not stain with carmine, and but weakly with eosin. They were not very refractive. From his description of the larger bodies, it is certain that they corresponded with those of Wickham, and of the smaller it is difficult to say whether they represent the typical bird's-eye inclusions or not. The description is, unfortunately, unaccompanied by illustrations.

The description given by Podwyssozki and Sawtschenko[3] varies somewhat from the description of other authors, but some of the inclusions illustrated by them present the characteristics of the typical bird's-eye form. Fig. 2, Plate VII, Fig. 20, Plate VIII, inclusion to the left, are characteristic. (See Fig. 7.) The technique employed by these authors was somewhat different from that of others, although based on osmic acid fixation, the stain being safranin and picric acid.

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[1] Kürsteiner.—Beiträge zur pathol. Anatomie der Papillome und papillomatösen Krebse von Harnblase und Uterus. *Virchow's Archiv*, Vol. CXXX, p. 463.

[2] Seegenbeck van Henkelom.—*Centralblatt f. allg. Pathologie und pathologische Anatomie*, Vol. I, p. 204.

[3] Podwyssozki and Sawtschenko.—*Centralblatt f. Bakteriologie*, Vol. XI, No. 16, 1892, p. 493.

After a most careful review of the forms of inclusions previously described in carcinoma, Borrel[1] concludes that the only bodies which under any circumstances could be considered as parasitic are the typical bird's-eye inclusions. In Figs. 8 and 9, Plate II, Borrel illustrates two large epithelial cells from epithelioma of the maxillary region, containing typical bird's-eye inclusions. (See Fig. 8.) Fig. 9 of this plate likewise shows forms suggestive of nuclear division, to be considered later.

Sawtschenko[2] describes as appearing in several tumors, the origin and number not being given, cell inclusions of the bird's-eye type. Those shown in Figs. 7, 8, 9, 10 and 11 are entirely characteristic. (See Fig. 9.) His preparations were from material hardened in Flemming's solution, stained with safranin.

Ruffer and Walker[3] illustrate these inclusions in Plate XIV, Figs. 4 and 8, from two cases of gastric carcinoma; Plate XVI, Fig. 10, from carcinoma of the breast; Figs. 20, 21, 25, 28, 29, hardened with Flemming and stained with methyl-green, Biondi, also from cancer of the breast.

Ruffer and Plimmer[4] in Figs. 2, 5, 6, 12, 18, 32, 35, 37 and 49 of Plates I, II and III, give excellent illustrations of typical inclusions. (See Fig. 10.)

J. Jackson Clarke[5] illustrates on Plate III, Fig. 6, a group of typical bird's-eye inclusions, and at 7 and 10, masses of what appear to be spore-like bodies of a similar nature. (See Fig. 11.) He considers these inclusions to be sporozoa.

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[1] Borrel.—Evolution cellulaire et parasitisme dans l'epithelioma. [illegible]*pelier*, 1892. *Thèse*.

[2] Sawtschenko.—Ueber schmarotzende Sporozoen in Krebsgeschw[illegible] *Centralblatt f. Bakteriologie*, Vol. XII, 1892, p. 17.

[3] Ruffer and Walker.—On some parasitic protozoa found in cance[illegible] tumors. *Journal of Pathology and Bacteriology*, 1893, p. 198.

[4] Ruffer and Plimmer.—Further researches on the parasitic protozoa found in cancerous tumors. *Journal of Pathology and Bacteriology*, 1894, p. 3.

[5] J. Jackson Clarke.—Observations on the Histology of cancer. *Centralblatt f. Bakteriologie*, Vol. XVI, 1894, p. 281.

PLATE XVIII

Fig. 1.

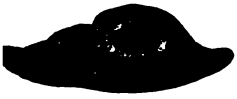
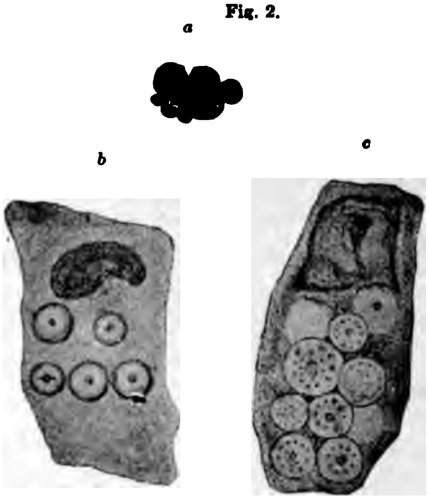


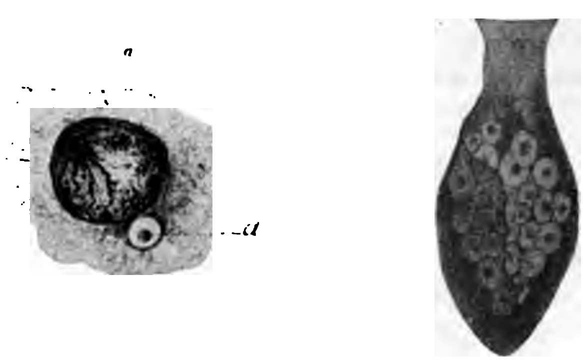
Plate II, Fig. 4*d*, after Virchow.

Fig. 2.



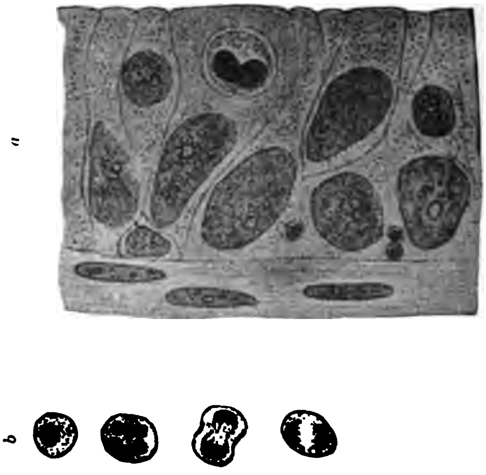
a **Plate XII, Fig. 17, after Soudakewitsch.**
b **Plate VI, Fig. 2, after Soudakewitsch.**
c **Plate XII, Fig. 7, after Soudakewitsch.**

Fig. 3.



a **Plate IV, Fig. 1, after Sjöbring.**
b **Plate IV, Fig. 14, after Sjöbring.**

Fig. 4.



a **Adenocarcinoma of the rectum—Thoma.**
b **Parasitic forms from above.**

Fig. 5.

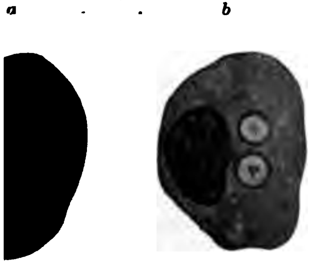


Plate II, Fig. 2, after Foa.
Plate II, Fig. 16, after Foa.

K

H. Cattle[1] describes typical bird's-eye inclusions, and cially calls attention to the fact that the inclusions can be id in the acini of the mammary gland at the margin of cancer ie breast, at the points where the epithelium of the acini is ergoing cancerous transformation. This is probably the first ite reference to the presence of bird's-eye inclusions in the ielium of the acini, where the epithelium still maintains its al acinous arrangment. (See Fig. 12.)

wtschenko[2] again describes, under a number of cell inclu- of varying forms, certain that represent typical bird's-eye isions. Fig. 30, Plate VI (see Fig. 13), carcinoma of the st, and 32 from the same; Plate V. Fig. 24, the lower figure, carcinoma ventriculi, and 25, upper figure, carcinoma of reast, are clearly defined bird's-eye inclusions.

anese[3] shows in Fig. 2, Plate IV (see Fig. 14), in one of the to the left, well-defined bird's-eye inclusions from carcinoma e breast.

J. Bosc[4] shows in Plate I, Figs. 1, 2, 3, 4, 5, 6, 7, 10, 11 and well-defined bird's-eye inclusions. On Plate II, Fig. 1 (see 15), are many inclusions of this type. Fig. 2*m*, Fig. 3*x*, Fig. Fig. 1*a*, Fig. 2*m*, Fig. 5*m*, 14, 15, 17 and 18 are from a case rcinoma of the pancreas and liver; Plate IV, Figs. 26 and 28, ielioma of the lower lip. On Plate II, Fig. 4, at "mor"; e III, Figs. 14, 15, 16, 18 and 19; Plate IV, Fig. 28; Plate V, 8 at "mor"; Fig. 12 at "mor"; Plate VII, Fig. 2*b* and e X, Fig. 4, the author pictures closely arranged groups iese bodies, which he considers to represent spore formation.

G. Plimmer[5] in his most recent article describes having

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ttle, C. H.—Observations on the Histology of Carcinomata and the ite-like Bodies found in them. *Journal of Pathology and Bacteriology*, II, p. 367, 1894.

wtschenko.—Sporozoen in Geschwülste. *Bibliothcka Medica*, DII, 4, 1895.

anese. Beitrag zur Histologie und Aetiologie des Carcinoms. r's *Beiträge*, 1896, Suppl. 1.

osc, F. J.—*A Monograph on Cancer*, Paris, 1898.

limmer, H. G.—On the Histology and Etiology of Cancer. The *ttioner*, April, 1899.

found these bodies in a large number of cancers, and gives illustrations from a cancer of the breast which contained unusual numbers. The figures on Plate I (see Fig. 16), Figs. 7, 8, 9, 10 of Plate II illustrates these inclusions.

Sjöbring[1] in his most recent publication, illustrates typical cell inclusions of especial interest. These are illustrated as appearing (see Fig. 17) in the epithelial cells of the epididymis of a rabbit, from the immediate neighborhood of a fragment of carcinoma which had been transplanted under sterile conditions into the tunica vaginalis of the animal.

E. von Leyden,[2] in Plate I, illustrates inclusions from a carcinomatous lymph node from carcinoma of mamma and a carcinoma of the cecum. He suggested the term "bird's-eye inclusion" which aptly describes the appearance of these structures.

Gaylord[3] illustrates these bodies in Plates VIII, IX, XIV and Figs. 2 and 3, Plate XV; Figs. 1, 2, 3 and 4, Plate XVI, all taken from carcinoma of the breast.

Feinberg[4] describes characteristic bird's-eye inclusions embedded in the protoplasm of cancer cells, as well as a form which he believes to be extra-cellular, which appears to be without a central body. His article is unaccompanied by illustrations, but from examination of his specimens there is no doubt Feinberg in part deals with the typical inclusions.

Greenough[5] illustrates on Plate XXXIII, Figs. 2 and 3, what appear to be typical bird's-eye inclusions. Plate XXXV, Fig. 3, appears to contain a typical inclusion. Those shown on Plate XXXIII were from a cyst adenoma of the breast. Fig. 3, Plate XXXV, is from carcinoma of the breast.

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[1] Sjöbring, N.—Ueber die Microörganismen in den Geschwülsten. *Centralblatt f. Bakteriologie*, Vol. XXVII, 1900.

[2] Von Leyden, E.—Zur Ætiologie des Carcinoms. ***Zeitschrift für klin. Medecin***, Berlin, 1901.

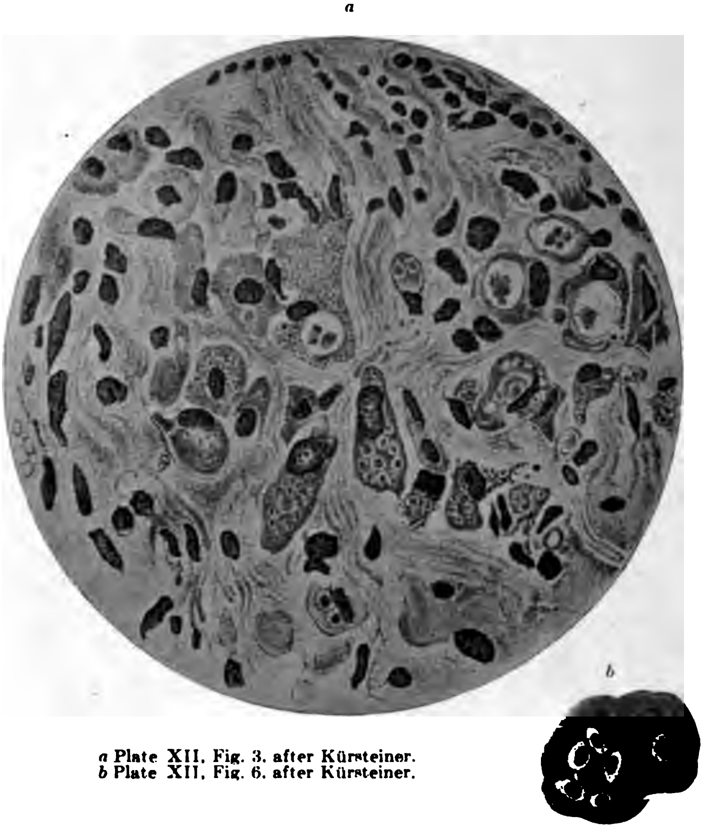
[3] Gaylord, H. R.—The Protozoön of Cancer. ***American Journal of the Medical Sciences***, May, 1901.

[4] Feinberg.—Zur Lehre des Gewebes und der Ursache der Krebsgeschwülste. *Deutsche med. Wochenschrift*, XXVIII, 11, p. 185, 1902.

[5] Greenough.—Cell Inclusions in Cancer. ***Journal of Medical Research***, Vol. VII, No. 2.

PLATE XIX

Fig. 6.



a Plate XII, Fig. 3, after Kürsteiner.
b Plate XII, Fig. 6, after Kürsteiner.

Fig. 7.

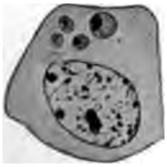


Plate VII, Fig. 2, after Podwyssozki and Sawtschenko.

Fig. 8.

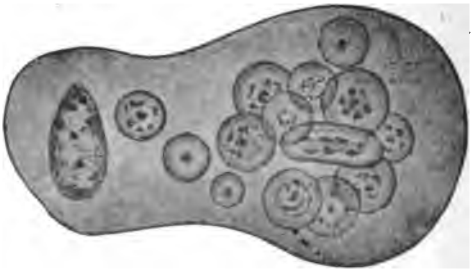


Plate II, Fig. 9, after Borrel.

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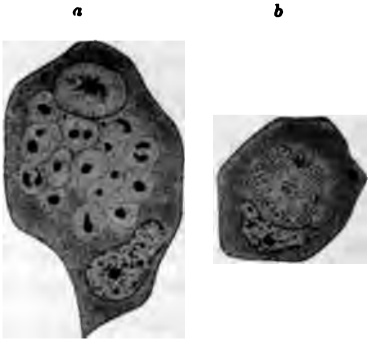
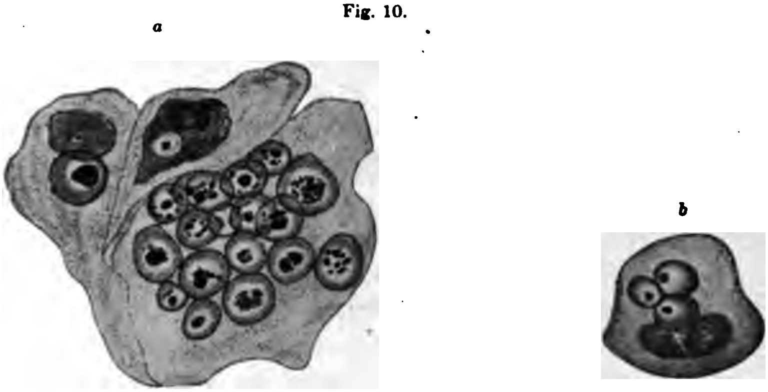
PLATE XX

Fig. 9.



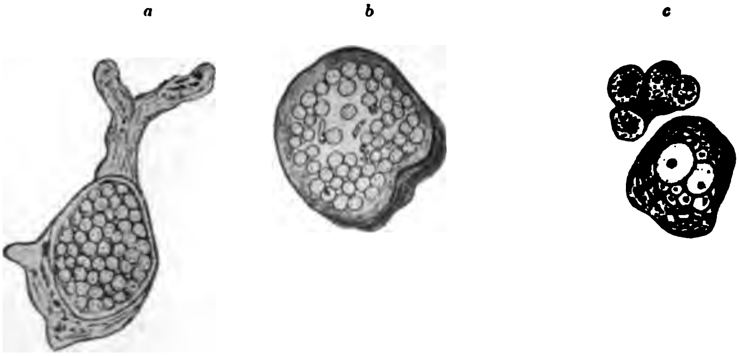
a Plate I, Fig. 10, after Sawtschenko.
b Plate I, Fig. 9, after Sawtschenko.

Fig. 10.



a Plate I, Fig. 5, after Ruffer and Plimmer.
b Plate XXIII, Fig. 11, after Ruffer and Plimmer.

Fig. 11.



a Plate III, Fig. 10, after J. Jackson Clarke.
b Plate III, Fig. 7, after J. Jackson Clarke.
c Plate III, Fig. 6, after J. Jackson Clarke.

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Nösske[1] illustrates on Figs. 1, 2, 3, 4c and 10, typical bird's-eye inclusions.

E. von Leyden[2] illustrates on Plate I (see Fig. 18) cells containing these inclusions from a case of pulmonary carcinoma and cancer of the breast. In Fig. 4*a* and *d* he shows a cell containing large masses of these inclusions, which he thinks are the germination of a process of spore formation. Figs. 3*a* and 3*b* show the same accumulation of closely packed smaller bodies in another cell. Several of his illustrations represent the bodies in the fresh state stained and unstained.

Posner[3] has recently published five drawings made by himself in 1876, while a student of Wagner's. (See Fig. 19.) These represent characteristic bird's-eye inclusions from carcinoma of the breast and one illustration of characteristic bird's-eye inclusions in a sarcoma cell from sarcoma of the spinal cord. This is the first recorded observation of bird's-eye inclusions in sarcoma.

Klimenko,[4] in an article reviewing a previous article of Feinberg, describes bird's-eye inclusions which he thinks, however, are not identical with those described by Feinberg. He was unable to find an inclusion corresponding exactly to those given by Feinberg. He has attempted to determine by microchemic reactions whether the bird's-eye inclusions are the result of degenerative processes, and concludes that they give no micro-chemical results indicating that they are. He agrees with Nösske that the inclusions are probably the result of secretive and excretive activity, or perhaps even evidence of reserve food stuff (glycogen) in the cells. He observed the fact that in certain cases of carcinoma of the breast, where there was great metotic activity in the cells, but few inclusions were present. On the other hand, in certain carcinomata, in which proliferation was not markedly active, a large number of inclusions could be found. He was unable to determine a direct relation between the presence of inclusions and metotic activity in the neighboring cells. He was never [illegible] to detect inclusions in cells undergoing division.

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[1] Nösske.—Untersuchungen über die als Parasiten gedeuteten Zelleinschlüsse im Carcinom. *Deutsche Zeitschrift für Chirurgie*, Bd. LXIV.

[2] Von Leyden, E.—*Ueber die Parasiten des Krebses*, 1902.

[3] Posner.—Notiz über vogelaugenänliche Einschlüsse in Geschwülstzellen. *Archiv. für klin. Chirurgie*, Bd. LXVIII, Heft 3.

[4] Klimenko.—Eine Nachprüfung der Arbeit Dr. Feinberg's über seine Krebsparasiten. Beitrag zur Frage über die Einschlüsse in und zwischen den Krebszellen. *Centralblatt für Pathologie*, Vol. XIII, No. 21, p. 837.

The theories advanced as to the significance of these bodies: (*a*) as degenerations of various kinds of the cytoplasm and nuclei of the cells. Of the authors already cited those who have undoubtedly observed and illustrated the inclusions which we are considering, Virchow, Pianese, Greenough and Nösske, interpreted them as the result of transformation or degenerations of the component part of the cells. Virchow in his first article interpreted these bodies as metamorphosed nuclei. In his second article he advanced the theory of endogenous cell formation [illegible] believed that the inclusions illustrated were cells thus [illegible] Borrel,[1] who previously held that these bodies were of a [illegible] nature, has recently suggested that they are produced by [illegible] tions in the centrosomes of the cancer cells. Pianese's [illegible] deals with a great variety of inclusions, and only those [illegible] Fig. 2, Plate IV, can be accepted as sufficiently characteristic [illegible] be included under the type we are considering. Pianese's investigations led him to the conclusion that all the structures illustrated were the result of different forms of metamorphosis, vacuolisation of the protoplasm, and hyaline and colloid degeneration. It would appear from the recent publication of Pianese that he has somewhat modified his interpretation of at least [illegible] tain varieties of the inclusions described in his extensive [illegible] graph. In his most recent[2] article, which deals with a protozo[illegible] infecting the renal epithelium of the guniea-pig, Pianese concludes that the presence of this organism leads to the development of active mitotic changes of the adjacent epithelial cells. These figures are either typical or atypical, and the latter closely resemble the forms of mitosis found in carcinoma. He likewise finds that the epithelium presents other characteristics [illegible]

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[1] Borrel.—Les Theories parasitaires du cancer. *Ann. de l'Instit[illegible] teur*, Vol. XV, 1901.

[2] Pianese. Ueber ein Protozoon des Meerschweinchens. *Zeitschr. f. Hygiene und Infectionskrankheiten*, Vol. XXXVI, Part 3.

PLATE XXI

Fig. 12.

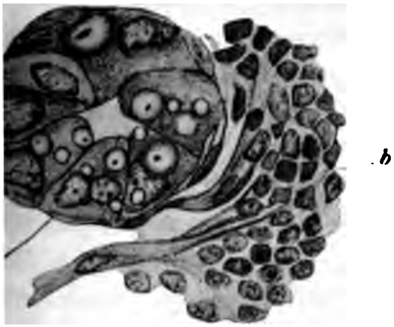


Plate XXII. Fig. 9, after Cattle.

Fig. 13.

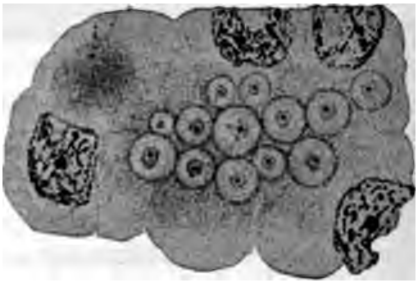


Plate VI, Fig. 30, after Sawtschenko.

Fig. 14.

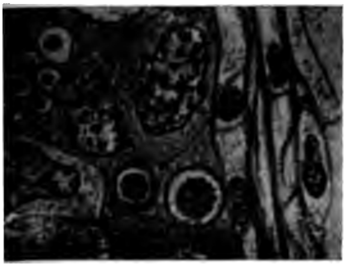


Plate IV Fig 2 after Pianese.

Fig. 15.

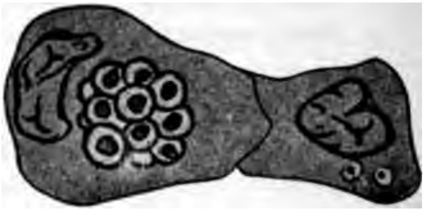
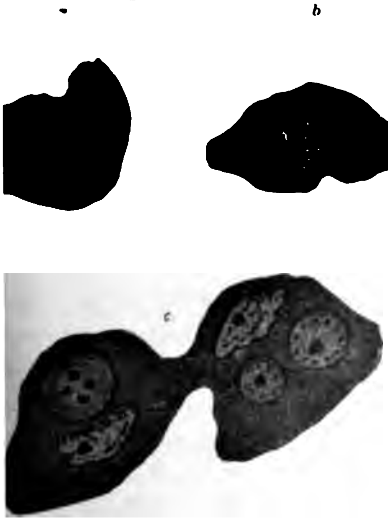


Plate II, Fig. 4, after Bosc.

Fig. 16



a Plate I. Fig. 5, after Plimmer.
b Plate I. Fig. 6, after Plimmer.
c Plate II, Fig. 9-10, after Plimmer.

Fig. 17

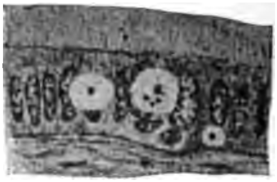


Fig. 1, after Sjöbring.

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ysis, karyorrhexis, nucleorrhexis and nucleolysis) uniformly
served in cancer cells. Lastly, he finds that many of the
ithelial cells contain inclusions closely resembling certain
rieties found in carcinoma. He was unable to satisfy himself
to whether these inclusions were stages in the development of
e parasite or changes produced in the cell by the indirect action
the organism. It would appear from this article that Pianese
es not at present hold fast to the conclusion, that all the cell
clusions in cancer are the result of degeneration of the cells.
Greenough concludes these bodies are the result of secretory
tivity of the cell. He bases his conclusions on the facts that
e inclusions are not found in epithelioma or sarcoma, and that
ey are found in non-cancerous diseases of the mammary gland,
e., fibroadenoma. Nösske arrives at a conclusion similar to
at of Greenough, believing the inclusions to be the result of
cretory activity on the part of the cells. Borrel[1] interprets
ny of the cell inclusions as centrosomes.

Besides these authors a number of critical articles have ap-
ared. Lubarsch[2] believes that the inclusions may be one of the
ur following: First, they may be the result of vacuolisation of
e cell protoplasm in which protoplasmic remains become con-
nsed and form a central body. Second, they may be centro-
mes (Borrel), numbers of which have been found in giant cells
y Heidenhain and Benda. Third, the bodies are the result of
e phagocytic activity of the cancer cells which take up red
lood corpuscles, these disintegrate, the remains forming the
ntral body. Fourth, the bodies are caused by secretion granula
round which a halo of pale protoplasm is formed. To these
ur may be added two more. Fifth, the belief that they are the
sult of special secretory activity on the part of the cells (Green-
ugh, Nösske); and, sixth, Hansemann[3] believes that these bodies
re formed as a result of the fixative which extracts the water
om hyaline material embedded in the protoplasm. As a result

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[1] Loc. cit.

[2] Lubarsch.—*Pathologische Anatomie und Krebsforschung*, 1902.

[3] Hansemann.—Die mikroskopische Diagnose der bösartigen Gesch-
ülste. Second Ed., 1902, Berlin.

of this extraction of water the hyaline material remains as a condensed central mass which forms the central body.

It will be seen from the above enumeration, that investigators who have interpreted these so characteristic inclusions as the result of metamorphosis of the cytoplasm, are in no way agreed as to the manner in which they are formed. Those who hold that the bodies are probably parasitic in their nature, have advanced certain arguments in objection to the above interpretation.

First of all, all investigators who have interpreted the bodies as parasites have failed to find characteristic inclusions in any other structures than tumors. It is claimed that in properly fixed sections the bodies present a characteristic appearance, and can be distinguished from simple vacuolisation of protoplasm. The most recent utterance on this subject is that of Benda.[1] He states that although he has searched carefully for these inclusions in all kinds of tissue he has failed to find them in anything but malignant growth. It must appear, then, that if the bodies are the result of vacuolisation of protoplasm, this form of degeneration is characteristic of carcinoma cells. An apparent exception to this statement is that contained in the publication of Nösske. This author claims to have found typical bird's-eye inclusions in the epithelium of the normal acini of the breast. An analysis of this statement shows first, that the normal breast referred to was located at the margin of a nodule of carcinoma. Through the courtesy of Prof. Marchand, the writer has had the privilege of seeing this section. After carefully viewing the preparation it appeared to us that the epithelium in question had already begun to proliferate. In one portion of the acinus there were three distinct layers of the epithelium. We were of the opinion in this case that the epithelium had already undergone cancerous metamorphosis. Dr. Nösske exhibited this preparation at the 31st Surgical Congress in Berlin, April 3, 1902. It was viewed by a number of pathologists, a majority of whom were likewise of the opinion that the epithelium had already undergone carcinomatous transformation. The presence of the inclusions, therefore, at the margin of carcinoma nodules would ather more strongly indicate that they were of parasitic nature han that they were degenerations. The observation is not new, he distribution of the inclusions in the acini at the margin of arcinoma of the breast having been referred to and accurately escribed by Cattle.

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[1] Benda.—Sitzung der Karzinom Comite, Oct. 4, 1902.

The bodies illustrated by Greenough found in fibroadenoma of he breast are undoubtedly characteristic bird's-eye inclusions, ut inasmuch as fibroadenomata are known in many cases to ecome transformed into cancer, and as the etiology of this form f tissue development is unknown, their appearance in this class f tumor in no way excludes the possibility of their being paraites. The inclusions shown by Nösske, as appearing in the ronchial epithelium in a case of congenital syphilitic pneumonia n a new-born child, are so essentially different from the bird's-ye inclusions as to be excluded, even from the illustrations hich accompany his article.

As to the second possibility that the bodies are centrosomes, s noted by Benda and Heidenhain (Borrel and LeCount[1]), this upposition is rendered improbable by the great number occasionlly found in a single cell. Kürsteiner counted as many as 80 n one cell, and Plimmer[2] illustrates a cell containing 27 incluions. (Fig. 23 illustrates a cell in which 18 cell inclusions can e counted.) Secondly, the fact that centrosomes can be found n cells containing these inclusions and can be definitely distinuished from them should dispose of this interpretation of the ody.

In this connection the evidence of Benda (*Verhandlungen der eutschen Gesellschaft für Chirurgie*, 31st Surgical Congress, erlin, April 3, 1903, p. 73) is of great importance. One of the rst to describe centrosomes, and quoted by Lubarsch as an uthority, he states first that centrosomes have often been sought r in carcinoma cells without their presenting any pathological lterations. He states that he has recently, with new and pecially proved methods, investigated this question, and holds at the *theory of Borrel is incorrect*, in that he has repeatedly found the centrosomes intact in cells which contained numbers of the bird's-eye inclusions. He holds that the hope of explaining the abnormal proliferation of carcinoma cells as the result of alterations of the centrosome is fruitless.

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[1] *Journal of Med. Research.*

[2] Loc. cit.

Third, the interpretation of these bodies as disintegrating red blood cells taken up by the epithelium (Lubarsch) has been advanced by various observers. This criticism has likewise been applied to preparations of our own in which we had injected Plasmodiophora spores into the tissue of warm-blooded animals, in repeating the experiments of Podwyssozki[1] where Plasmodiophora spores were taken up by the phagocytic connective tissue cells of the animal and presented an appearance, in many cases, indistinguishable from the bird's-eye inclusions in carcinoma. In attempting to definitely exclude the red blood cells as a factor in the production of these forms, which we held to be metamorphosed spores, we examined a number of specimens taken from nodules developing on the peritoneal surface of frogs which had been inoculated in the same way. These nodules were composed of endothelial cells (as described by Podwyssozki) containing the spores of Plasmodiophora Brassicæ, many of which again presented an appearance identical with the cell inclusions in carcinoma, and identical with the spores embedded in the connective tissue phagocytes surrounding the fragments of implanted club-root in warm-blooded animals. (See Fig. 23.)

The results of these two lines of experimentation were exactly the same, but the great difference in the red blood corpuscles of the warm-blooded and cold-blooded animals, in the first case non-nucleated, in the second case much larger and nucleated, left no doubt that the inclusions in both cases were the metamorphosed spores of Plasmodiophora Brassicæ. In neither series of experiments were we able to determine that the phagocytes had taken up red blood cells, although in other pathological conditions, i. e., typhoid fever, it is a recognized fact that phagocytic cells commonly take up the erythrocytes. The difficulty of determining the origin of inclusions in cells without the aid of experimentam is emphasized in this case. Many of these bodies are larger an red blood corpuscles, and in properly prepared specimens have never been able to find any ground for holding that they re altered erythrocytes. The fact that in many cases the cen- l bodies of the bird's-eye inclusions can be stained with a clear stain, likewise speaks against this supposition.

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[1] Podwyssozki.—Myxomyceten, resp. Plasmodiophora Brassicæ Woron. als Erzeuger der Geschwülste bei Tieren. *Centralblatt für Bakteriologie*, Vol. XXVII, p. 97.

Fourth and fifth, that the bodies are not secretion granula or result of special secretory activity on the part of the cell is re difficult to prove, but the fact that they have occasionally en found (Posner) in sarcomata render either explanation ther improbable. The statement of Nösske that they are only und in glandular epithelium and almost exclusively in the mmary gland, a view which Greenough holds, and to which were previously inclined ourselves, is shown to be incorrect a critical review of the literature of the earlier writers. This ws that undoubted bird's-eye inclusions have been found in cinoma arising from other types of epithelium.

Sixth, that the characteristic appearance of these bodies is not e to any action of the hardening process (Hansemann) is wn by their *constant appearance in fresh material, where y have later been found in hardened and stained sections.*

As parasites.—With the exception of the authors above men- ned, the remainder of those who have accurately described or strated these inclusions have interpreted them as parasites. e earlier investigators compared them to recognized types of tozoa, notably the coccidia and the gregarinæ. Many of these thors describe, besides the forms which we are considering, ger and more complex structures presenting appearances not like certain forms in the development of these organisms. The nger form of coccidium perforans (Leuch) (coccidium ovi- me), in the epithelium of the intestinal tract of rabbits is tremely like in appearance the bird's-eye inclusions of cancer.[1] e readiness with which ectogenous form of coccidia can be tected in the tissues of the animals infected, has, however, akened the force of this comparison, because of the absence in fresh material of cancer of forms presenting anything like the definite characteristics of the ectogenous cycle of the coccidia. A class of organisms which has attracted the attention of the more recent writers on the subject is the mycetozoa, especially one of the group, Plasmodiophora Brassicæ, an organism which causes tumors and outgrowths in plants. This class was previously placed among the lower types of fungi, but more recently has been accepted as a variety of protoza, Doflein, in his recent book on the subject classifying it under the rhizopoda.

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[1] See Fig. 221, Lang, Lehrbuch der vergleichende Anatomie der wirbel- en Thiere. Zweite Lieferung. Protozoa.

The first to call attention to a possible connection between cancer and kohlhernia was R. Behla. He noted the prevalence of this disease in plants in localities in which cancer was prevalent. He inoculated animals with fragments of the plant tumors and noted that granulation tumors resulted. He did not, however, detect the presence of the parasite in the tissue cells. Podwyssozki[1] after viewing the preparations of Nawaschin in a preliminary announcement, called attention to the fact that certain forms of this organism and certain inclusions in cancer presented great points of similarity. He afterward reported experiments upon rabbits, guinea-pigs, frogs and axolotls, in which he had succeeded in producing infection and had detected the presence of the spores in the cells of the infected animal. He found that the introduction of the spores of plasmodiophora in the tissues of both cold and warm-blooded animals led to the development of tumors of considerable size made up of cells derived either from the connective tissue, or from the endothelium of the surrounding lymph spaces. In the latter case the tumors presented the characteristics of an endothelioma. He was able to determine that the presence of the parasite led to the proliferation of the nuclei of the infected cells.

Following Podwyssozki, von Leyden[2] likewise noted the similarity between bird's-eye inclusions and the amœboid form of Plasmodiophora in the plant cell. Feinberg[3] emphasizes the same similarity. Nösske does not think the similarity of the cell inclusions and the amœboid form of Plasmodiophora to be so great.

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[1] Loc. cit.

[2] von Leyden, E.—Zur Ætiologie des Carcinoms. *Zeitschr f. klin. Medecin*, Vol. XLIII, Part ½. Ueber die Parasiten des Krebses. *II Ergänzungsband vom klinischen Jahrbuch.*

[3] Feinberg.—Ueber den Erreger der krankhaften Auswüchse des Kohls (Plasmodiophora Brassicæ Woronin). *Deutsche med. Wochenschr.*, March 3, 1902.

All these comparisons, except that of Behla are based upon the publication of S. Nawaschin.[1] Upon receipt of this article we were greatly surprised at the remarkable similarity between many of Nawaschin's figures and bird's-eye inclusions in cancer. According to Nawaschin, the organism first appears in the plant in the form of an amœba, after having entered as a swarmer. These amœbæ are found in the plant cells lying in the sap spaces and, except in very early infections, a number were found in each cell. The amœbæ contain in their protoplasm when observed in the fresh state, highly refractive granules of equal size, which present an appearance very much like fat. The nuclei are spherical or oval, and consist of a vacuolous structure with a central body. It is this nucleus which so resembles the bird's-eye inclusions. The organism having become transformed into an amœba in the plant cell, *lives a strictly symbiotic existence with the infected cell.* It divides by a special form of cell division which we shall consider in detail, and only when the plant cell is exhausted is the cycle inaugurated, which leads to spore formation.

This latter cycle, that of spore formation, is entirely distinct from the process of nuclear division by which the amœbæ increase in number. In the younger forms of the organism (Fig. 20) the protoplasm surrounding the nucleus of the parasite is scarcely distinguishable from the protoplasm of the plant cell and extends into it in delicate prolongations. The change leading to nuclear division in the amœba are first found in the appearance of fine grains of chromation within the nucleus, scattered indiscriminately in the clear space between the central body and the periphery. (Fig. 21*a*.) The nuclei in this stage are somewhat larger than immediately after division. These chromatin granules group themselves about the central body which first becomes indistinct (Fig. 21*b*) and then divides. They are more or less definitely arranged in the form of a circle in the plane of the division. (Fig. 21c.) A section through the nucleus in this stage shows the two central bodies closely approximated, with the smaller chromatin granules in the transverse axis. A section in the transverse axis shows the central body surrounded by a ring of chromatin granules, presenting the appearance of a rosette. (Fig. 21*d*.) The nucleus in this stage has already assumed an oval form, and the central bodies then withdraw to the poles of the cell. (Fig. 21*e*.) In this stage they are sometimes connected by one or two threads of chromatin which later disappear. Division is then completed by the capsule folding in at the center, leaving two perfectly formed nuclei, each with a central body, the two closely approximated. (Fig. 21*f*.) In this way a single amœba may possess a number of nuclei.

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[1] **Nawaschin, S.**—Beobachtungen über den feineren Bau und Umwandlungen von Plasmodiophora Brassicæ Woron. im Laufe ihres intracellularen Lebens. *Flora*, 1899, Vol. LXXXVI, Part 5.

Aside from the characteristic nucleus, the protoplasm of the amœba is of interest, containing, as it does, in the fresh state, coarse granules of uniform size. These granules are blackened by osmic acid, and on the extraction of the fat from the preparations they disappear, leaving a coarsely reticulated protoplasm. (Fig. 21*f*.) The central body of the nucleus, when stained with Flemming's triple stain, reacts variably to the stain. When in the amœboid form the central body of the nucleus stains brilliant red. In the first stage of spore formation the central body stains a deep blue-black. This point is of importance inasmuch as certain discrepancies in the staining of the central bodies of the bird's-eye inclusions have been previously noted.

The process which leads to spore formation is entirely distinct from that by which the amœba, as such divides. In preparation for this process the nuclei of the amœba divides repeatedly by the method already described, thus each amœba contains a number of small nuclei. The margins of the amœba then become indistinct, the nuclei likewise become less distinct and the different amœbæ coalesce. The central body of the nucleus then becomes very indistinct, the protoplasm granular. The nuclei at this stage contain fine granules and are with difficulty distinguished from the surrounding protoplasm. The whole structure now forms a plasmodial mass. There now develops in each nucleus a well-defined spindle with medullary plate, all of the nuclei dividing at once. This process of division follows the recognized types of mitosis, and when complete the entire mass breaks down into small amœbæ, each containing one nucleus. These are at first of irregular shape and stain poorly. The irregularly shaped myxamœbæ are gradually rounded and condensed until they ultimately form spherical bodies of similar size with well-defined margins, each containing a highly refractive central body. It is to be noted that the *complete spore again presents an appearance not unlike the nuclei of the amoebae.*

Recognizing the great similarity between the bird's-eye inclusion in cancer cells and the nuclei of the amœba in Plasmodiophora in the plant cell, a similarity which to a lesser degree is shared by spores of Plasmodiophora, it occurred to us to search our preparations for evidence of some form of division in the inclusions, and likewise to determine if the protoplasm surrounding the inclusions could be distinguished from the remaining protoplasm of the epithelial cell. In searching our preparations we came upon one which has already served us for photography, the illustrations of which appear in our previous publication, being the low power illustrations on Plate VIII, Plate XIV, Fig. 1, Plate XVI.[1]

The preparation consisted of a thin section, approximately 2 mm. square, taken from the margin of a rapidly growing carcinoma of the breast. It contained a large number of inclusions, in many fields every cell containing one or more. The fixation of this preparation was unusually successful and the differentiation excellent. We had little difficulty in repeatedly finding forms extremely suggestive of the method of division, illustrated in Fig. 21—*a*, *c*, *d*, *e* and *f* from Nawaschin. Fig. 24 was repeatedly found and appears to represent a stage similar to that shown in Fig. 21*a* Nawaschin. We next repeatedly encountered inclusions in which the central body had divided, and in nearly every case found two small granules of chromatic material in the transverse axis so arranged as to present an appearance exactly like Fig. 21*e* from Nawaschin. In Fig. 25 an inclusion presenting this appearance is shown. The two granules in the transverse axis are extremely small and were photographed with difficulty. It is this form which, when sectioned in the transverse axis, produces the rosette appearance which was likewise repeatedly encountered. In Fig. 26 the central body lies somewhat below the plane of focus and the rosette appearance is not so characteristic as occasionally seen. Many forms were found in which the rosette was apparently sectioned in an oblique plane so that but one-half of the rosette appeared in the inclusion. Fig. 27 shows what appears to be the next stage in the process of division, the two central bodies having withdrawn to the poles of the cell, and separation of the two by the capsule is suggested by the appearance of the inclusion. Bodies which had apparently divided were repeatedly found, Fig. 28 representing this stage. In Fig. 29 are likewise seen bodies cut somewhat obliquely, also representing this stage. We had no difficulty in finding all of these forms repeatedly.

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[1] *American Journal Med. Sciences.*

A careful examination of the protoplasm surrounding the inclusions was made to determine whether a differentiation of the possible protoplasm of the parasite and that of the epithelial cell could be made. In many cases a distinct reticulation of the protoplasm was visible as in that surrounding the two inclusions in Fig. 28. In one or two portions of the section we found what appeared to be inclusions surrounded by reticulated protoplasm which had become detached from the nuclei of the cells in which they were included. Fig. 29 shows an inclusion of this sort surrounded by reticulated protoplasm, which has become detached from the nucleus of the cell lying slightly to the left. In certain cells we found large numbers of small inclusions closely packed. In these we were unable to find any evidence of the changes above described. Fig. 23 shows a cell containing a number of bodies somewhat more distinct than those containing the apparent nuclear changes.

A number of observers have undoubtedly spoken of similar groups of inclusions as representing spore formation. (Bosc, von Leyden, Jackson Clarke.) The similarity of inclusions of the type shown in Fig. 23 to those already described, led us to

PLATE XXII

Fig. 18.

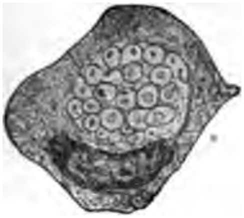
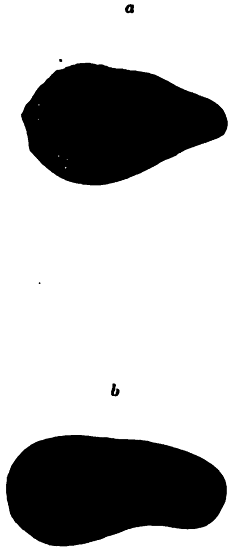


Plate I, Fig. 4*a*, after von Leyden.

Fig. 19.



a Fig. 3, after Posner.
b Fig. 5, after Posner.

Fig. 20

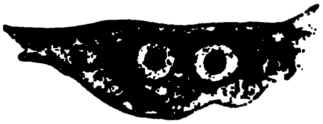
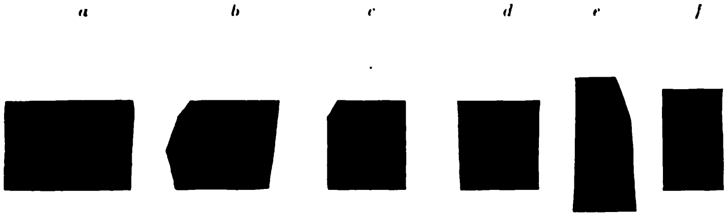


Plate XX, Fig. 6, after Nawaschin.

Fig. 21.



a **Plate XX, Fig. 14, after Nawaschin.**
b **Plate XX, Fig. 17*f*, after Nawaschin.**
c **Plate XX, Fig. 17*e*, after Nawaschin.**
d Plate XX. Fig. 17*d*, after Nawaschin.
e Plate XX. Fig. 18*d*, after Nawaschin.
f Plate XX. Fig. 15, after Nawaschin.

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repeat the experiments of Podwyssozki, for the purpose of ascertaining what appearance the spores of Plasmodiophora Brassicæ presented when embedded in the connective tissue and phagocytic cells of animals. This series of experiments was undertaken with uniform results. The spores could be found in the large connective tissue phagocytes embedded in the protoplasm of the cells. They consisted for the greater part of spherical bodies of vacuole-like appearance with a central body. Hardened and stained with Plimmer's method, they stained, as does the protoplasm, and presented an appearance in size, form and other characteristics indistinguishable from the cell inclusions in cancer. Fig. 22 represents two large phagocytic cells from the margin of an implanted fragment of clubroot in a guinea-pig, removed after nineteen days. The cell to the left contains a form of inclusion most commonly seen. Between the two cells are two larger forms which are constantly encountered in the fresh scrapings. These are spherical bodies with delicately defined limiting membranes and with fine granular contents, or in some cases filled with homogeneous material. The two bodies shown lying directly between phagocytes are undoubtedly of this nature. It is probable that they represent a stage in degeneration of the spores. They are of interest inasmuch as bird's-eye inclusions in cancer are commonly encountered, which contain finely granular material and have invariably been quoted in support of the degeneration theory. It is evident that these spores under certain conditions undergo degeneration, which would render their differentiation from other products of degeneration difficult. Nösske has recently advanced a line of reasoning of this nature to show that all the bird's-eye inclusions represent a form of secretory activity on the part of the cells. Those who have studied the bird's-eye inclusions have apparently failed to consider the possibility of the inclusions, if of parasitic origin, undergoing a process of degeneration.

It will be seen from the foregoing that in the spores of Plasmodiophora Brassicæ we have a form of parasite which, embedded in the protoplasm of a cell, frequently presents an appearance indistinguishable from certain of the cell inclusions in cancer.

Fig. 26. Cross section of inclusion similar to that shown in Fig. 25. The central body lies just below the focal plane, the grains of chromatin arranged in the form of a rosette about it. (Compare with Fig. 3 from Nawaschin.)

Fig. 27. Oval inclusion with two central bodies widely separated at poles. Suggestion of division with two bodies barely visible. (Compare Fig. 4, Nawaschin.)

Fig. 28. Two inclusions immediately after division. Central bodies well defined. Inclusions surrounded by reticulated protoplasm.

Fig. 29. Group of cells containing inclusions. At *a* an inculsion surrounded by reticulated protoplasm has become detached from the cell in which it was embedded. The inclusion in the surrounding reticulated protoplasm presents an appearance extremely like the myxamœbæ of Plasmodiophora.

February 1, 1903.

PLATE XXIII

Fig. 22.

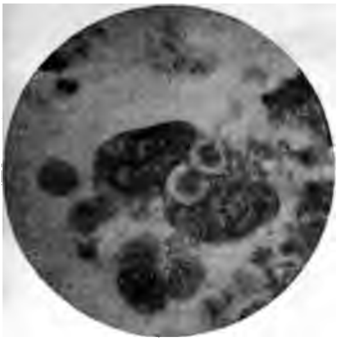


Fig. 23.

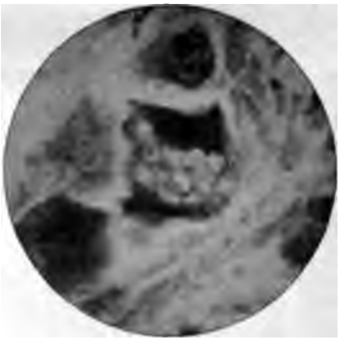


Fig. 24.

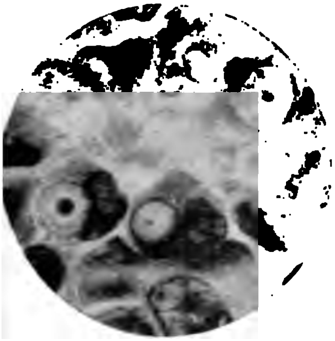


Fig. 25.

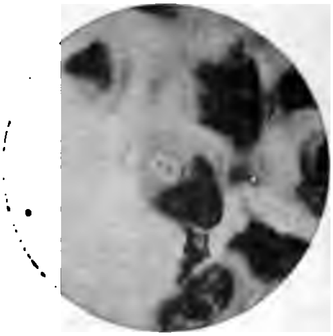


Fig. 26.

Fig. 27

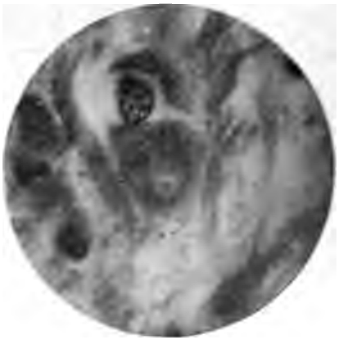
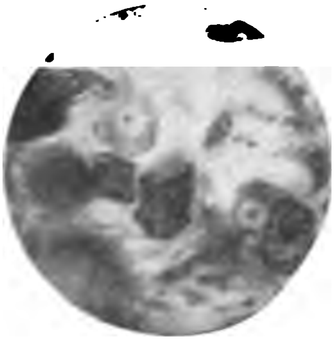


Fig. 28.

Fig. 29.



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uggestions for the Biological Study of Cancer.

By Gary N. Calkins, Ph. D.,
djunct Professor of Zoology, Columbia University; Consulting Biologist.

It will be unnecessary for me to review in these pages the two des of the controversy relating to Protozoa as causing certain uman diseases. The historical aspect of the cancer problem in his connection has been ably handled by Dr. Park and Dr. Gayord, and needs no *a priori* defense from the biological side. Dr. aylord and others are wont to regard the "vaccine bodies" in accinia and in Variola and the cellular inclusions in Carcinoma s similar in nature, and the position which has been taken in his Laboratory in regard to the biological significance of these nclusions is well known. Thanks to the discoveries of Dr. Counilman we now know that the "vaccine bodies" form one phase f the life history of the protozoan organism which causes smallox, while other stages, found only in Variola, penetrate the ucleus and give rise to cell inclusions of a very different type. t has been my privilege to work out the entire life-cycle of the mallpox organism upon material provided by Dr. Councilman, nd the question as to the specific organism of smallpox is no onger open to doubt. Many of the other diseases belonging to he same group as smallpox (the exanthemata) will in all probbility be shown to have a like etiology.

The fact that the cause of a malignant disease like smallpox, hich has baffled scientific research for so many years, can be aced directly to a protozoon having a definite systematic posiion must strengthen the contention made for a like origin of ancer. Notwithstanding the wide difference in the clinical spects of the two diseases, this is particularly so when we consider the striking similarity existing between the "vaccine bodies" and some forms of the cell inclusions of cancer. Such a contention should be made, however, only as a working hypothesis, and until material is obtained which will demonstrate without doubt that the inclusions in Carcinoma are phases of an organism the advocates of this hypothesis should be content to work upon the possibility alone.

It would be very difficult at the outset to plan out a series of conclusive experiments demonstrating the presence and activity of a specific micro-organism as the cause of Carcinoma. The chance of hitting upon a successful experiment would be extremely slight, and the possibility of finding an ectogenous phase of such an organism would be small indeed. To my mind it would be far more profitable scientifically to work out in clear detail some well-known growth due to a specific protozoon, such, for example, as the study suggested by Dr. Gaylord of the tumorous outgrowths in some vegetables which are known to be due to the specific organism *Plasmodiophora brassicae*. In the second place, inclusions in carcinomatous tissues should be studied by specialists trained to the study of Protozoa and not left exclusively to pathologists, many of whom regard all structures which are to them incomprehensible, as some type of degeneration product of the cell. Such a study, made with the best methods and the best technique that the zoological side can afford, should lead to an independent point of view and should give definite results which, together with those of the pathologist, the chemist, the physiologist and the surgeon, should give a clear conception if not a solution of the general problem of Carcinoma.

In the third place, to my mind the problem should be attacked from the physiological and chemical point of view, with especial reference to the possibility of specific activity of toxins of micro-organism origin.

In the fourth place, when the morphological side has yielded all its possibilities, the experimental side, strictly speaking, may well give some definite and conclusive results. Such experiments based upon the knowledge of the life-history of the possible organism would then produce results without loss of time, for by analogy with other Protozoa we would know what phases of the life-history of the organism would give best results.

The first work that I wish to do in connection with the cancer problem is to make a thorough study of the morphology of the cell inclusions, using the most careful technical methods, and to compare these structures with the developmental phases of all kinds of Protozoa where such development is known. A great amount of literature has accumulated in regard to these cell inclusions, and many structures which have been described by various observers may well be taken as a basis for observations from the biological point of view, although such structures may have been variously interpreted as degeneration products, as secretions, or what not, by the various observers. Thus the work of Sawtschenko, based upon carefully prepared material and with accurate illustrations, and later the work of Borrel, based upon an equally efficient technique, have given a basis for my own observations on the carcinomatous cell inclusions. This morphological work is far from complete, and is not yet in form for publication, but enough evidence has been independently acquired to justify the provisional assumption that these cell inclusions are neither secretions, as Greenough describes, nor degeneration products of the cell, as most pathologists very generally describe, nor are they modified centrosomes and spheres, as Borrel maintains, but phases of an organism belonging to the group Protozoa. This is based upon the discovery, not only of amœboid forms enclosed within the characteristic capsule which is typical of the so-called "Plimmer's bodies," but upon reproductive phases, upon nuclear changes and upon characteristic morphological protozoan structures. There is reason to believe that the capsule mentioned above is not a part of the organism but a more or less specific modification of the surrounding plasm through the action of a toxic substance created by the organism. Such a conclusion is strengthened, first, by the fact that when the inclusions are in the cytoplasm the capsules have the characteristic cytoplasmic staining reactions, while when these same structures are within the nucleus, where I have repeatedly found them, the capsules take the characteristic chromatin stains. Second, by the fact that, with what may be interpreted as possible later stages of the organism, the capsule is much thicker than in the supposed younger phases, a fact which can be interpreted only as due to the continued activity of some formative cause.

While such structures justify the provisional assumption of a protozoan organism in cancerous tissue, they do not justify the contention that their presence is the cause of cancer, nor is there enough evidence as yet to indicate in what group of Protozoa the possible organism belongs. Feinberg, in a recent paper, lays himself open to criticism by his unproved assumption that these inclusions have a characteristic protozoan nucleus, and he follows Korotneff, Behla and others in giving a new generic and a new specific name to the supposed organism, which, as *Histosporidium carcinomatosum*, he is unable to place in any known group of Protozoa. His principal argument—the structure of the nucleus—is weakened because of the complete oversight of the great numbers of Protozoa in which the nuclear structures do not agree with his "type." If this inclusion is an organism we may look not only for such "typical nuclei" but also for nuclear structures and nuclear processes like those of bacteria or certain of the lower Mastigophora, where a definite morphological nucleus is wanting and where structures are found which Hertwig has described under the name *Chromidien*, and which I have described as "distributed nuclei." It is certainly conceivable that, living as intra-cellular parasites, there is no need of a functional nucleus, except for reproduction, any more than a tapeworm has need of a digestive tract.

It might be of interest in the present place to point out one or two biological interpretations concerning the origin of tumorous growths in human tissues. It is quite difficult, indeed, to separate such interpretations from pathological conceptions, but in one or two cases at least the attempt has been made. Quite recently Boveri, studying the question of heredity on the cytological basis, was able to show that the chromosomes, which are definite chromatin structures of a certain size and always of the same number for the same species of animal or plant, have each a specific part to play in the organism. Thus, in the egg cell of a sea-urchin, where the nucleus of the fertilized egg contains thirty-six chromosomes, if some of these chromosomes are removed, as Boveri was able to do by ingenious experiments, the result is a deformed embryo. Further, the deformity depends upon the nature of the chromosomes that are removed. Boveri concluded from these experiments that each chromosome of the egg defines a certain localized area or set of structures in the adult organism; and further, he maintained that should anything cause the displacement or removal of the chromosomes an abnormal development would result. Applying this result to the question of malignant tumors, Boveri assumed that the well-known atypical division figures of carcinomatous tissue give the chance for an irregular distribution of the chromosomes to the daughter cells; and, he argued, in this way the typical number and arrangement of the chromosomes are disturbed, with an abnormal growth as the result. Ingenious as this theory is, it nevertheless begs the question as to the origin of the tumor, for it leaves unexplained the cause of the irregular division figure and the continuation of such irregularity, which cannot be considered in any sense a normal process, and which therefore must be ascribed to something abnormal in the organization—possibly a toxin of organic origin, possibly an enzyme of other origin.

Quite a different hypothesis was offered last year by the writer and based upon experiments made on animals even more remote from the human organism than the sea-urchin. The experiments were undertaken with the purpose of ascertaining the length of time that a protozoan organism could live upon the same diet and without the intervention of the usual and normal sexual processes. A single individual of *Paramoecium caudatum* was isolated in a small chamber containing a limited supply of food medium, hay infusion. At the end of twenty-four hours the individual divided; that is, reproduced asexually, and two organisms were found the next day in the cell. Each was isolated as the first one was, and treated in the same way, the result being four individuals at the end of forty-eight hours. These were again isolated and the process repeated day after day and generation after generation for a period of twenty-three months, or until the race died out from what was unmistakably protoplasmic old age, in the 742d generation. Paramœcium had been studied in like manner previously by two different observers, each of whom found that the vitality of the organisms gave out at the end of the 150th to the 170th generation, when the entire race died. A similar experience threatened the cultures which I had undertaken, for at the end of such a cycle the individuals began to die at an alarming rate and showed unmistakable signs of physiological exhaustion. The survivors, however, were given a change of diet in the form of beef extract in place of hay infusion for one thing, while a simple salt (potassium phosphate) was also used. In both cases the result of the change was a renewal of physiological activity, or a rejuvenescence, and with the new potential of vitality thus obtained a new cycle of 170 odd generations was started. The process had to be repeated at the expiration of this second cycle, and a stimulus was again necessary to save the race. A third time the process was repeated, but the renewal of activity was not as satisfactory as the earlier experiences, and at the fourth period all efforts to rejuvenate were futile and the race died out from protoplasmic senility.

The point of this experiment in the present connection is that a stimulus of artificial nature gives a renewal of vitality to physiological processes which have become weakened through continued activity. An ordinary cycle of Paramœcium of 170 generations might be compared with a given tissue in the human organism, the difference being that the cell progeny from the primordial cell in Paramœcium remain separated, while in the tissue the progeny from the original cell remain connected and become differentiated. In the paper which was published last year the suggestion was made that such tissues run through their dividing activity at a certain period of life and become in respect to that function worn out. A stimulus of some nature may, like the change of diet in Paramœcium, or like the potassium phosphate, renew the vitality of some one or more of these worn-out cells and cause them to proliferate. Such proliferation at an unusual time and in the full-grown organism could give rise to but one result, namely, a pathological growth.

The point now arises as to the nature of the stimulus. A chemical substance, such as a toxin, might do it in the same way that potassium phosphate stimulates the worn-out race of Paramœcieum, and the toxin might be produced by an included organism. That this toxin production is possible with protozoan parasites is demonstrated by the well-known case of Malaria, in which the pyrexial attacks are due to the liberation of substances produced by the malaria organisms.

It can do no harm certainly, and it may lead to positive results to carry out a series of experiments upon the basis of the above hypothesis, and the morphological work will combine with the physiological and chemical to this end.

Report of the Biological Chemical Department.

By G. H. A. Clowes, Ph. D.

The study of the cancer problem from a biological standpoint is one which must be approached from several different sides simultaneously in order to obtain a clear conception of its importance. Such work should be carefully elaborated and every detail confirmed by means of duplicate experiments before the results are published. A large amount of fruitless work has been carried out in the past, owing to the fact that individual investigators have frequently taken up a single phase of the subject, disregarding other possibilities than those which they themselves had in view, and have based their results upon single experiments which have subsequently proved to be incorrect. Bearing these facts in mind, we laid down in a previous report a scheme of work to be followed out in this department so soon as it should be possible to carry on such work under favorable conditions. Since the establishment of our new Laboratory the work which had previously been confined to simple experiments, mostly with reference to various forms of parasites which were supposed to play a part in the causation of cancer, was extended to more elaborate experiments, many of them of a strictly chemical nature.

The subject was treated under three main heads: I. The study of Metabolism as it exists in patients suffering from cancer as compared with normal individuals and those suffering from other diseases. This portion of the subject involves study of the stomach contents, blood, urine, etc., and will be dealt with more fully at a later period. II. Experiments made with a view to obtaining evidence regarding the cause of cancer, and if a parasite should be that cause, of determining what is the nature of the parasite. Biological-chemical experiments of this nature are mostly micro-chemical and usually based upon theoretical considerations, and the evidence to be obtained from them must be looked upon as more or less circumstantial. III. Attempts have been made to cure cases suffering from cancer by means of serum therapeutic treatment and the use of various chemical agencies, the probable value of which has been indicated by the experiments made under the head of Metabolism. Under this heading curative effects produced by the X-rays have been carefully studied with a view to discovering their mode of action.

The work included under the heading of I, " Metabolism," and III, " The Treatment of Cancer," is necessarily very complicated and slow in giving results. The frequent errors in diagnosis, even on the part of the most expert physicians, the death of patients and their removal from the hospitals, and the fact that our experiments are necessarily more or less confined to incurable cases, makes it necessary to be extremely conservative in any statements regarding results until those results have been established in a large number of similar cases, and until a sufficient length of time has been allowed to intervene in order to obtain definite data regarding the course of the disease.

Part I may be subdivided into:

a. Study of the secretions of the stomach in cancer as compared with the results found in other diseases and under normal conditions.

b. Examination of the blood of cancer patients with a view to discovering any abnormal constituents, either toxins or chemical products due to abnormal cellular metabolism; also a comparison of the relative proportion of certain constituents of the blood under normal and pathological conditions in which cancer and other related diseases are involved.

c. Study of urine and excreta, especially during the last stages of cancer comparing the proportions of the various normal and abnormal constituents at various periods of the disease with those found under normal conditions.

d. A chemical examination of various transudates and exudates found in patients suffering from cancer.

e. Chemical analyses of tumors themselves as compared with normal tissue, and an examination of such tumors from a toxicological standpoint.

f. A careful comparative study from a chemical standpoint of tumors supposed to be derived from the cells of other organs present in the body, with a view to proving whether these derived tumors possess the same properties and contain the same chemical bodies and enzymes as those cells from which they are derived.

A large amount of work has been carried out under each of these separate headings:

a. Study of from thirty to forty stomach contents, eight of which were diagnosed as cancer of the stomach. It has been established without any doubt that the hydrochloric acid secretion in the stomach is not in any sense proportional to the peptic activity; that hydrochloric acid is not necessarily absent in cancer of the stomach, and that the total absence of hydrochloric acid, accompanied by lactic acid, is not necessarily indicative of cancer. The writer has attempted in every case to fractionate the products of peptic digestion, and if possible to prove some relationship between the amount of so-called free and combined hydrochloric acid with one or more fractions of the digested proteids. In carrying out this work it has been observed that the methods ordinarily adopted in analyzing stomach contents are extremely faulty, certain constituents which are normally absent being included, while others which are normally present are incorrectly estimated and included in the wrong part of the analysis. It is not possible to go further into detail regarding this work at the present moment, but a paper fully covering the subject of the analysis of stomach contents, peptic activity and hydrochloric acid in the stomach secretions in cancer as compared with other diseases, and the bearing which these results have upon the whole problem of cancer metabolism will shortly be published in one of the medical chemical journals.

b. Exact analyses of the blood as a whole, of the serum and corpuscles, have been made in four cases of cancer; in each case the diagnosis had been confirmed either by an operation or autopsy. Also analyses of the blood of animals suffering from cancer have been made and these results have been compared with those obtained from a large number of normal individuals. In each case we observed diminution in the alkalinity as compared with the normal. Chlorides and certain other constituents were undoubtedly high, while the fractionation of the nitrogenous compounds showed the presence of certain bodies which are probably not present normally, or at least in smaller proportions. Further enzymes, such as oxydasese and toxins capable of affecting red blood corpuscles, were also considered, but so far, perhaps owing to the small amount of material at our disposal, it has not been possible to bring positive proof of any of these bodies being present in proportions deviating to any considerable extent from the normal. The difficulty of such an investigation either from a chemical or biological standpoint will be realized when it is remembered that the cachexia obtaining at the last stages of cancer is frequently complicated by secondary changes in the tumor itself, due to the destructive influence of bacteria, the excretory products of which seriously complicate the problem.

c. Urinalyses. Under this heading must be considered several long series of urinalyses carried out from day to day, frequently covering periods of three and four weeks, during which the greatest care has been taken to secure full twenty-four hour samples without any loss of material. In a few cases the influence of diet has been carefully considered, an exact record of the food consumed having been made, and on comparison of the analyses of the food and urine from day to day it has been possible to observe the progress of the patient. In dealing with this subject it has been our endeavor to arrive at exact results under three principal headings: 1. Variations of normal constituents of the urine in cancer. 2. The influence upon the katabolism of the organism produced by varying diet and the therapeutic treatment. 3. The presence of abnormal constituents, their proportions if considerable, and especially has it been our endeavor to discover some body or bodies characteristic of cancerous urine which might be made use of for the purpose of early diagnosis. Experiments have beeen frequently interrupted or have miscarried owing principally to the difficulty of controlling patients, but our results have on the whole been fairly constant, and it is to be hoped that in the course of the next few months we shall have accumulated enough material along these lines to justify publication. It has already been found possible in certain cases to determine the location of the tumor from the nature and proportion of the bodies found in the urine. It must, however, be carefully borne in mind that many results of this sort are probably of a secondary nature, rather due to disturbance of normal cell metabolism than to the production of abnormal constituents by the cancer cells. The fact, for example, that cancerous urine is extremely toxic for animals has long been known, and repeating the experiments of previous investigators, we have been led to conclude that this action is due rather to the abnormal state of the patient, whose metabolism has been so interfered with that a large number of suboxidized bodies are excreted with the urine, which, if properly oxidized, would exert far less toxic action than to the influence of any specific toxin. We have also commenced series of experiments regarding the effect produced in the urine by the injection directly into the tumor mass itself of certain chemical substances.

d. Three peritoneal transudates have been examined chemically. In one the exact secretion by this means of chlorides, of various nitrogenous constituents from day to day was accurately determined, and the figures obtained will be of value in the general study of metabolism which we propose to elaborate at a later date. Experiments made with this material on animals with a view to inducing immunity will be referred to later. It should be noted under this heading, as well as in the case of urine previously referred to, that a large number of investigators have described what they supposed to be unique chemical products characteristic of cancer which they had discovered and isolated. The repetition of their work by the writer has invariably led him to the conclusion that they had mistaken well-known normal products of metabolism for something of a more complicated nature.

e. The chemical analyses of ordinary tumors have not shown anything very remarkable or particularly worthy of interest, consequently very little time has been devoted to that branch of the subject. Also, on examination for toxins by disintegrating the tumor mass, filtering through a bougie under pressure, whereby bacteria, etc., are removed, it has not been found possible to produce any marked toxic effects except in those cases in which a secondary decomposition of the tumor mass had taken place.

f. Investigation of chemical constituents of tumors derived from specific cells. Previous investigators have proven that tumors derived from the thyroid gland contain iodine and are capable of reacting in many respects as do the thyroids themselves. Bearing this in mind we examined a hypernephrom supposed to be derived from the adrenal, with a view to observing the nature of its chemical constituents and whether it contained a body capable of exerting the same effect upon the blood pressure as does the extract of normal adrenals. Unfortunately the only good specimen which has been put at our disposal had previously been placed in formaldehyde and subsequently in alcohol, so that the negative results which we obtained were only to be expected. The other cases which we examined proved on subsequent pathological diagnosis not to be hypernephromate. We are looking for fresh material in order to repeat our own experiments and also to confirm those recently published by Crofton. Making use of formaldehyde hardened material, we have been unable to obtain a differentiation of the tumor material from normal kidney and other tissues by means of his iodine reaction with the same facility that he claims for it.

II. Regarding the cause of cancer and the nature of the probable parasite. In studying biological problems involved in cancer from a chemical standpoint, with a view to establishing the exact nature of the disease, and if possible obtaining evidence regarding its cause, we have endeavored to free our mind entirely of the preconceived notions held by the majority of those who are working in this subject. The notions referred to are frequently based on observations made by means of the microscope on sections of tissue which, in the course of the hardening and staining processes to which they have been submitted, have undoubtedly undergone very considerable morphological and chemical changes so that no absolute significance should be attributed to them, whereas they are undoubtedly of very great value as a means of supporting evidence obtained in other ways. Strictly chemical work under this heading is almost entirely of a microscopical nature. An examination of yeasts and protozoa of various types (Plasmodiophora Brassicæ) compared with fresh cancer material has been carried out, and most of the work under that head has been incorporated in previous reports made by Dr. Gaylord, and will not therefore be considered at this stage. Certain cells normally found in cancer and known as mast cells have been investigated in hopes of determining their chemical nature and in that way obtaining some insight regarding their function in the tissue. The results of a series of such micro-chemical experiments, when completed, will be published in a microscopical journal and will, we hope, serve to bear out the statement previously made regarding the influence exerted by the chemical bodies to which the tissue is submitted during the hardening and staining processes.

III. As regards the cure and treatment of cancer, other than by means of the X-rays, a very little can be said at present. As stated above, we have only been able to make use of inoperable cases, which under normal circumstances should be expected to succumb in the course of a few weeks or months as the case might be. We have tried the serum treatment, following the lines usually adopted in the treatment of other diseases in which the infective agent is known, but without any marked result, which was to be expected when the probable nature of a cancer parasite is considered. In the paper preceding this, written by Dr. Gaylord, and dealing with the probable nature of a cancer parasite, it will be seen how completely such an organism deviates from bacteria, and how impossible it is to draw any conclusions regarding its mode of development, so-called culture and mode of transmission, or regarding as a possible means of inducing an immunity against it along the lines already developed in bacteriology. From various considerations it is highly probable that any such organism has so much in common with the normal elements of the blood as to make an immunity established against it practically result in auto-intoxication. This is a subject, however, which is not sufficiently investigated at present and must be referred to a later period. The author has in the course of the last few months collected and abstracted all the literature bearing upon the subject of immunity in general, and especially all that which would have any possible bearing on the cancer problem, and is firmly convinced that any attempt to treat that phase of the subject in the same way as previous problems in immunity have been handled will fail to yield results. Some entirely new conception of the whole problem must be evolved.

We have investigated the effect produced by normal sera and so-called immune sera. Also that of certain chemicals which we were led from our metabolism experiments to suppose would exert a specific effect upon the development of the tumor. These experiments have undoubtedly in a few cases retarded to a certain extent the development of the cancer and even produced a considerable diminution in size, and have also in certain cases alleviated the pain, but we are not very sanguine regarding such treatment and should not wish to suggest its general application at present. We shall, however, in the course of another year have ample opportunity to make some accurate observations under this head.

The treatment by means of X-rays is being fully dealt with by Dr. Park in another publication. In conjunction with that work we have made observations from time to time regarding the metabolism of individuals suffering from cancer who were undergoing the treatment. We are also at the present time carrying out a very elaborate series of experiments on normal and diseased animals with a view to arriving at a clear conception of the mode of action of the X-rays upon the tissue, the effects they produced in the blood and urine, etc., and from what we have so far obtained, it seems probable that we shall be able in the course of time to gain a clearer insight regarding the nature of the action produced by these physical agencies in the living body.

To summarize the results obtained, it may be said that a large amount of work bearing on widely different phases of the subject is in the course of completion; only a few of the less important pieces of work have been entirely finished, and much that has a very significant bearing upon the subject has barely been commenced. In the course of the last year, since our new laboratory was established, the greater part of the strictly chemical work, involving many hundreds of analyses, has been carried out. Such a work of necessity takes a considerable amount of time. It would be useless to approach such a subject from any one point of view, as has been done by so many investigators previously without success. To cover the subject completely it was necessary to start the work upon a large scale, upon such a scale that it has been found impossible to arrive at any positive conclusions up to the present. This is partly owing to the difficulty of obtaining exactly that material which one most requires. In spite of the fact that we are situated in a so-called cancer district, the amount of material at our disposal is not so large as might be wished, and work on certain types of rare tumors must frequently be postponed for a year or more for want of material. Consequently it is our endeavor to carry on work continuously on that material which is most readily available, and in addition, when the opportunity offers to investigate those more unique cases which are hard to obtain. Owing to the fact that so many errors have been made in the past by the publication of results based on too small an amount of material we have resolutely adhered to our original intention of refusing to publish any results which have not received repeated confirmation. We have also made a point of confirming all data regarding normal conditions of metabolism where any question of deviation from the normal was involved, since the figures stated by pathologists are frequently extremely incorrect.

In conclusion it may be said that the work so far carried out in the Laboratory, together with the greater portion of the literature bearing directly or indirectly upon the subject, harmonizes with the views held by Dr. Gaylord regarding the probable parasite of cancer, as published in a previous portion of this report. The evidence which will be adduced in support of the theory from a biological-chemical standpoint, is of course indirect, but in such a case indirect evidence is of considerable value, and the fact that it is difficult to explain the proliferation of cancerous tissue from a physiological-chemical standpoint, without the intermediate action of some such organism foreign to the body itself (as has been attempted by some recent investigators) is in itself a support of the parasitic theory.

February 1, 1903.

Treatment of Cancer.

By G. H. A. Clowes, Ph. D., and Herman G. Matzinger, M. D.

A series of cases suffering from cancer have been submitted to a chemical treatment based upon the results obtained in the chemical laboratory with reference to the metabolism of patients suffering from cancer. We should prefer not to make any definite statements on the subject at present, as sufficient time has not been permitted to intervene since the commencement of these experiments in order that proper observations should be made, but we have to record a considerable improvement in the condition of several patients, a disappearance of pain, and marked retardation in the development of the tumor mass, and in some cases a considerable diminution in its size.

Further details regarding this mode of treatment will, we hope, be elaborated in the course of the next year, when we shall be in a position to publish our experiments.

February 1, 1903.

A Note on the Toxic and Vital Theories Regarding the Causation of Cancer and their Bearing Upon the Parasitic Theory.

BY G. H. A. CLOWES, PH. D.

The theory has recently been advanced in several prominent publications that the proliferation of the cells of malignant tumors may be attributed to the action either of toxins or of chemical bodies resulting from abnormal cell metabolism. This statement is usually made without further qualification, leaving the reader to form his own opinion regarding the exact nature of the reaction involved. It must, however, be borne in mind that a toxin or chemical body capable of producing the phenomena observed in cancer should scarcely be the product of the normal or abnormal metabolism of human cells, without the intervention of some external agency; and it is with the intention of showing that the phenomena in question may most readily be attributed to the intervention of some form of parasite that a few points worthy of interest will be briefly referred to at this stage.

If we are willing to assume (and it can scarcely be doubted in view of the existing evidence) that some toxic or chemical body plays an important role in causing the cells of malignant tumors to proliferate, the question may well be asked, From what source is this body derived and how does it exert its specific action on the cell? Three possible alternatives may be considered:

1. Some interference with its normal function gives rise to the production within the cell of a toxin or chemical body capable of exerting a specific action upon the cell and thereby stimulating it to abnormal development.

2. Some toxin, generated possibly at a considerable distance from the point at which the tumor commences, but possessed of

an affinity for that particular type of cell, is absorbed by the latter and stimulates it to proliferate.

3. The parasite infecting the cell and itself proliferating and producing a toxin capable of exerting an irritating action on the host cell causes the latter to proliferate.

The first and second alternatives may readily be disposed of in view of the following facts:

A toxin can never (so far as we know) reproduce itself or aid in its own reproduction. It either produces no result, or it exerts a more or less pronounced action on the cell exposed to it; if that action is too great for the cell to overcome, the latter succumbs. If, on the contrary, the cell is capable of counteracting its toxic activity, an antitoxin will probably be produced. A similar line of reasoning applies to the action of a simple chemical body which is capable of exerting a poisonous action. It reacts with those groups in the cell protoplasm for which it possesses the maximum affinity, and if the quantity introduced is sufficient the cell is destroyed. If this is not the case, the chemical body in question, together with those portions of the protoplasm which have been disturbed by its action, are removed in the ordinary course of cell metabolism; and unless a fresh supply of the same body is introduced in continually increasing quantities the stimulation of the cell by this means ceases.

In view of these facts it is evident that even were it possible for a toxin or chemical body (produced under abnormal conditions within the cell itself) to stimulate the latter sufficiently to bring about proliferation (which is highly improbable) the body in question would rapidly become exhausted, or at least diluted to such an extent as to render further proliferation under its influence out of the question. As was stated above, such bodies are quite incapable of helping to reproduce themselves; the reverse would rather be expected. One is therefore in order to uphold the possibility of the first alternative (mentioned above) forced to the conclusion that the fresh cells derived from the original cell which first proliferated have inherited the power of reproducing within themselves that stimulating agent, toxic or otherwise, under whose influence they themselves will subsequently be forced to undergo further proliferation. Such an assumption is quite unwarranted. No analogy for any such action exists in nature, and any such theory may be summarily dismissed in view of the fact that the principal difficulty which it presents (i. e., the source of supply of the ever increasing quantities of toxic material required to stimulate the increasing number of tumor cells) may so readily be explained by assuming the presence of a parasite, as will be shown later.

A second alternative, that the toxin in question is produced in an entirely different portion of the body from that in which the particular cells involved are located, may also be disposed of by means of similar arguments. It must be borne in mind that this toxin would have to exert a selective action; it would have to possess an affinity for one particular type of cells, but why then should it select any one particular cell, or, having selected that cell, why should it further show a preference for the derivatives of that particular cell after repeated proliferation has taken place? Further, the toxin in question would have to be supplied in ever increasing quantities from without the cell, for as stated in the argument brought against the possible production of a toxin or chemical body within the cell itself it is quite inconceivable that such a body introduced from without should lead to the continuous reproduction of itself within the cell in question and its derivatives. It is, on the contrary, highly probable that an antitoxin or antibody would be produced, or that the cells would become so accustomed to its action as to be less readily stimulated to proliferation than the surrounding cells of the same species. From these considerations it will be seen that when the cell undergoes subdivision in order to counteract the influence of any poisonous body to the action of which it may be exposed it is highly improbable that the derivatives of that cell would be endowed with the faculty of reproducing that particular type of poison, or that they would be more susceptible to its influence than are the surrounding cells of the same type. The opposite result might be expected in both cases.

The third and only explanation of proliferation of the cells of malignant tumors as being due to the action of some toxic body which has any significance, or is in any way borne out by the facts with which we are acquainted, is that the cell in question has become infected with some type of parasite which itself proliferates and produces toxins which in their turn react upon the host cell, compelling it to undergo subdivision in self-defense. It must be borne in mind that the encounter taking place under such circumstances between the host cell and the parasite which has been introduced is one in which the excreta of the parasite play a very important part. It is by this means alone that the parasite is enabled to protect itself against the forces normally possessed by the cell whereby the latter is enabled to destroy and assimilate or eject any foreign body finding its way into its protoplasm. The parasite being once established naturally proliferates and its excreta and the toxins which it probably produces cause such inconvenience to the host cell that in order to diminish the number of parasites per cell and consequently the concentration of toxins, the cell itself proliferates. It then becomes a question of the relative speed at which host cells and the parasites within them proliferate, and the relative toxicity of the excreta of the parasites as to whether the host cells by continual proliferation eventually succeed in entirely overcoming the parasites, or whether owing to a uniform and continuous subdivision both of host cells and parasites an exact condition of equilibrium is established; or whether as a third alternative the parasite succeeds in entirely exhausting the cell, in which case the parasite would in all probability form some type of permanent spore which would no longer produce toxins capable of affecting the surrounding tissue.

For such a mode of procedure we have a good analogy in the case of certain forms of paramœcia, which, on becoming infected by lower types of parasites, frequently proliferate and in that way are enabled to recover from the infection. (See Metchnikoff, *L'Immunité*, page 20.)

Another rather ingenious but extremely farfetched suggestion is that made by Foulerton, who attempts to account for the proliferation of epithelial cells by assuming that up to that point the cells in question have been restrained in their natural tendency to develop by the action of some antibody induced by reactive materials which are continually passing into the system from organs undergoing degeneration. This line of argument is so involved and introduces so many assumptions for which we have no analogy that it is hardly necessary to consider it in comparison with the much simpler explanation of toxic activity previously referred to in connection with the parasitic theory. It is, however, our intention to treat this subject more fully at a later period.

It must be borne in mind in dealing with this phase of the subject, just as it has been shown in Dr. Gaylord's contribution to this report, that the question regarding the existence or nonexistence of a parasite in cancer cannot be decided by making use of generally accepted bacteriological principles, so it will probably be found necessary to treat the questions involved in toxic and chemical activity in a manner entirely different to that employed so successfully at the present moment in dealing with those problems in which bacteria and their products are concerned.

February 1, 1903.

A Statistical Study of a Rural Cancer District in the State of New York.

By Irving Phillips Lyon, M. D.

BROOKFIELD, MADISON COUNTY, NEW YORK

I selected this place for investigation as the result of a detailed compilation and analysis of the mortality statistics published in the Monthly Bulletin of the New York State Board of Health for a period of years, the substance of which analysis showed that, of the various sanitary districts into which the State is divided, the East Central District* presented the highest death rate from cancer, and of the many specified localities in this district, for which separate figures were given, the township of Brookfield, in Madison county, showed the highest cancer mortality rate. In fact, Brookfield** was distinguished from all the other specified localities of the district by a death rate from cancer which was not even approximated by any other place.

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* For the year 1900 the cancer mortality per 100,000 of population in the different sanitary districts ranged from a minimum of 59.2 to a maximum of 82, as follows:

1. Adirondack and Northern District, 59.2 per 100,000 population.
2. Maritime District, 63.5 per 100,000 population.
3. Lake Ontario and Western District, 64.9 per 100,000 population.
4. Southern Tier District, 66.8 per 100,000 popualtion.
5. Hudson Valley District, 69.1 per 100,000 population.
6. Mohawk Valley District, 71.9 per 100,000 population.
7. West Central District, 73.4 per 100,000 population.
8. East Central District, 82 per 100,000 population.

Whole State, mean, 67 per 100,000 population.

** The Brookfield death-rate from cancer per 100,000 population for the period 1887-1900 was 149, based upon the returns published in the Monthly Bulletin of the New York State Board of Health. The highest rate for any other specified locality in the East Central District was approximately 102 (Delhi).

and this rate was determined on the basis of the entire period, 1887-1900.

Having thus determined a locality of remarkable cancer mortality, I went to Brookfield in December, 1901, and again in May, 1902, and made a careful personal study of the local cancer incidence and of the various special conditions and factors that might be related to it.

Description of Brookfield.— The township of Brookfield lies close to the center of the State of New York, in Madison county. Its extent is roughly ten by eight miles, embracing approximately seventy-five square miles of territory. The country is very rough and hilly, partly wooded, and generally covered with poor farm lands and grazing hillsides. It is well drained from its hillsides into occasional brooks and small streams. Agriculture* and dairy farming are the only occupations of the people. There are no factories in the township. The population of the entire township in 1900 was only 2,726, of which number 485 lived in the village of Brookfield. Besides this principal village, the township includes the village of Leonardsville, somewhat smaller in population than Brookfield village; North Brookfield village with about 200 inhabitants, and the hamlet of South Brookfield, with a few houses clustered at crossroads. The township of Brookfield is therefore strictly rural.

Collection and classification of statistics.— I began my study by an investigation of the official register of births and deaths in the town clerk's office. I made a transcript therefrom of every death certificate in which the immediate or the accessory cause of death was assigned as cancer or malignant tumor of any variety. I did the same for all cases in which the assigned causes of death, where inexactly stated, suggested cancer as the real cause. With these transcripts in hand I visited the physicians who had signed the original death certificates and made a thorough canvass of the medical history, symptoms, signs and facts relating to each case. In a small minority of cases in which the original medical attendants were dead or inaccessible I either accepted the records at their face value or, where possible, obtained confirmatory or negatory evidence from the other living practitioners, who as consultants had had personal knowledge of the cases in question. As the result of this cross-examination of the various physicians I determined the actual number of deaths in which they affirmed and insisted upon cancer (including all forms of malignant tumor) as the cause of death either immediate or accessory, and I completed my records on this basis. I included in this enumeration all cases in which a malignant growth existed in the patient at the time of death, whether the physician regarded such malignant growth as the primary and immediate cause of death or as secondary and accessory to some other complications or terminal infection. For it seemed to me immaterial whether, with a general incurable and fatal malignant growth, the patient actually died from the immediate effects of this disease or in addition had and succumbed to nephritis, cerebral hæmorrhage, pneumonia, influenza or other terminal complication.

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* There has been claimed to exist, by certain writers, a possible etiological relation to cancer of a disease in cabbages, turnips, beets, etc., known as "clubfoot disease," "root disease," etc., this plant disease being caused by a microorganism called *Plasmodiophora Brassicae.* It is not inappropriate, therefore, to mention here that "clubfoot disease" has extensively prevailed in Brookfield and the surrounding country and has been known, in some instances, to destroy a large part of a farmer's cabbage crop.

Accepting then all cases of death in which cancer was diagnosed and affirmed by the physicians, I obtained records of 84 such cases dying in Brookfield during the fifteen-year period, 1886-1900.* The number of deaths assigned to cancer as the cause by the monthly Bulletin of the New York State Board of Health for the same period was 70, 14 less than the number that I found was properly so assignable. This difference is due chiefly to the method employed in the office of the State Board of Health of assigning cases to that cause which is given in the death certificate as the "immediate" cause of death, whether the immediate cause be given as "grippe" and the accessory cause as "cancer," or vice versa. My figures are therefore higher than the State statistics by 20 per cent.

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* The official records were incomplete prior to 1886.

Sex and anatomical distribution.— By sex the 84 cases of cancer were divided into 35 males and 49 females, a usual ratio of the two sexes. The involvement of organs by sex is shown in Table I. Nothing unusual is noted in this distribution.

Comparison of cancer death-rates in Brookfield, State of New York, and registration area of United States.— We have then 84 cases dying from cancer in Brookfield during the fifteen-year period, 1886-1900. The number of deaths from all causes in the same period, determined from the town clerk's official register, was 719. The mean annual population of Brookfield for this period, determined from the United States census, was 3,076. A comparison of these figures shows a most striking and remarkable cancer mortality rate. Thus a mean annual population of 3,076 showed a mean annual mortality of 47.93 from all causes and of 5.60 from cancer, or an annual death-rate from cancer of 1.82 per 1,000 of population. The cancer mortality compared with the general mortality showed one death from cancer in every 8.559 deaths from all causes — 11.68 per cent.

How remarkably high this cancer rate is may better be appreciated by comparing it with the corresponding rates for the State of New York, as a whole, and for the census registration area of the United States, the figures for the latter two areas being for the census year 1900, and both being computed from the United States census. Thus compared the annual cancer death rates per 1,000 of population were for Brookfield, 1.82; for the State of New York, 0.61, and for the United States (census registration area) 0.60, the Brookfield rate being therefore about three times the rate for either of these larger areas. If we take the Brookfield rate obtained from the cancer deaths of Brookfield as given in the Monthly Bulletin of the State Board of Health (1.51 per 1,000 of population) the Brookfield rate is found to be about two and one-half times the rates of the larger areas, or, exactly stated, the ratio of the Brookfield rate to that of the whole State of New York is 2.47 : 1.00.

Are there any general factors that may, in part, account for the high cancer death-rate in Brookfield?—How can this remarkable cancer death-rate, two and one-half times the normal, be accounted for? Are there any well-known factors, recognized by vital statisticians, that may be supposed to have influenced it, or must we seek its explanation entirely outside of such general factors in special and at present unknown or conjectural factors of etiology? Among such recognized general factors, *longevity* and *error in diagnosis* must be considered in relation to the cancer death-rate, and I shall attempt to demonstrate that each has been operative in determining a part of the cancer mortality in Brookfield.

Influence of longevity on cancer mortality in general.—The relation of age to cancer mortality is too well known to require more than brief mention. A glance at Chart I will show graphically how rapidly cancer death-rates increase for each added decade of life. Thus, for Massachusetts, in 1895 the cancer death-rates per 100,000 of population of corresponding ages increased from 28 for the fourth decade of life to 96 (3.4 times) for the fifth decade; to 214 (7.6 times) for the sixth decade; to 348 (12.4 times) for the seventh decade, and to 452 (16.1 times) for the eighth decade. The increase is sustained through each succeeding decade of life.

Longevity in Brookfield.—Brookfield is a poor rural community, in which a livelihood is with difficulty obtained. As a result there is no increase of the population by immigration, but a continued loss by the emigration of the youth. The birth-rate is low. For the fifteen years 1886-1900 the births exceeded the deaths by only 38. The population has thus decreased, as shown by the United States census, viz., 1880, population 3,685; 1890, population 3,260; 1900, population 2,726. Those who are left to care for the farms and the homes are the *adults, who,* living a simple life in a salubrious climate, *live to advanced age and die old.* The truth of this assertion if fully confirmed by the figures for Brookfield given in Tables II and III, and is made the more striking by comparison with the corresponding figures for the United States registration area. The average age at death from all causes for Brookfield in the period 1886-1900 was 54.4 years,*

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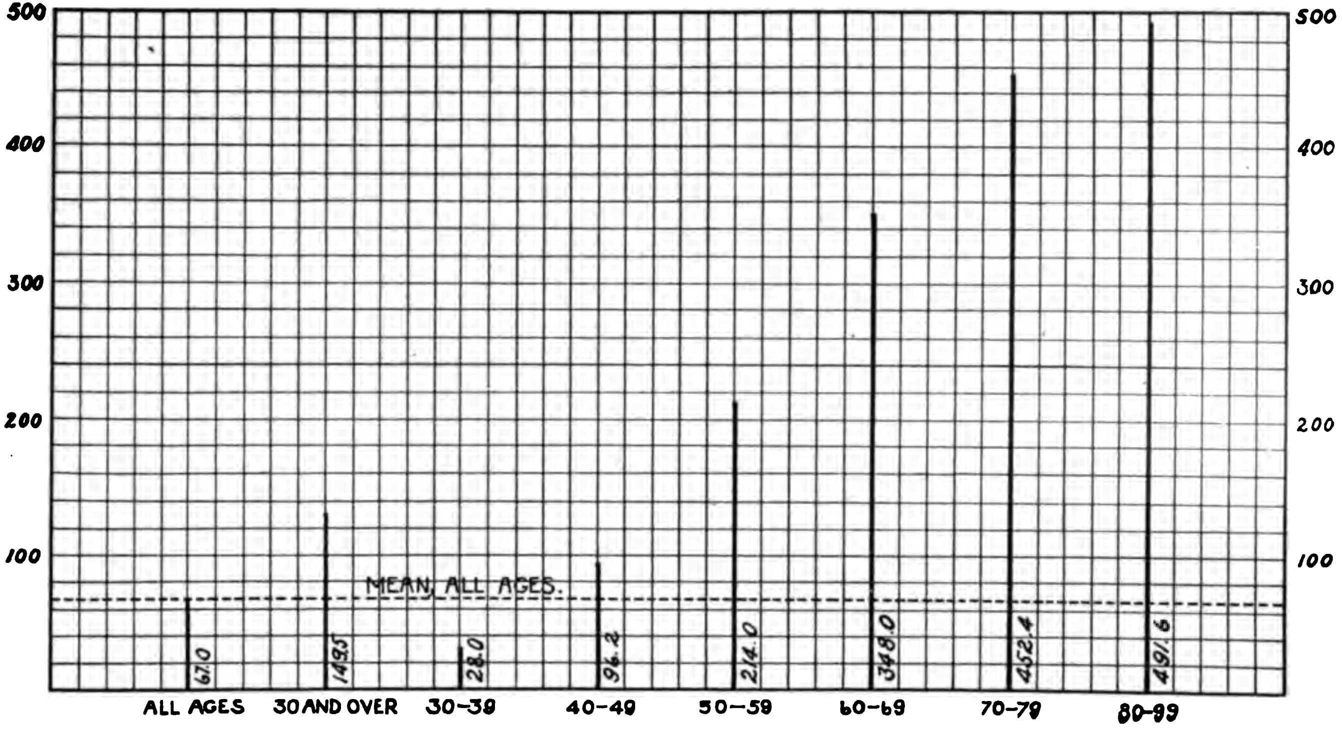
* Determined from the death-records of the town clerk's official register.

Chart I. *Geographical Representation of the Influence of Age on Cancer Mortality.*

Deaths from Cancer in Each Age Group, per 100,000 Population of Corresponding Age Group, for Massachusetts, in 1895.*



trasted with 35.2 years for the registration area of the United tes for the census year 1900. Sixty-one per cent of all deaths m all causes in Brookfield occurred in persons over the age of years contrasted with 31 per cent (about one-half) for the ited States registration area. For the age of 65 years and r, the corresponding figures for Brookfield and for the United tes were, respectively, 49 per cent and 21 per cent. Exactly reverse is shown for the infant and child mortality of Brook- d compared with the United States. In Brookfield only 17 per t of deaths occurred under the age of 20 years; in the registra- n area of the United States 37 per cent, more than double the e in Brookfield. Under the age of 35 years (the period of life relative cancer immunity) only 25 per cent of deaths from all ses in Brookfield occurred, whereas for the United States regis- tion area 50 per cent occurred in this period of life.

nfluence of longevity on the cancer mortality of Brookfield.— th the proof then that longevity must have been an important tor in determining the high cancer mortality of Brookfield, at part of this cancer mortality can be accounted for solely by longevity of the population? This question cannot be swered at once in terms of cancer death-rates per 1,000 of popu- ion, by age periods and by sex, for the data for such calcula- ns are not obtainable. We can, however, obtain an answer to s question by indirect means and with a fair degree of uracy.

f we assume that the cancer period of life is from 30 years of upward — and this assumption* is approximately correct — is possible to ascertain for various large bodies of population at percentage of all deaths over 30 years of age is represented deaths from cancer in the same age period, and thus to estab- a certain standard of cancer mortality which we may regard normal. With such a standard of normal we may compare the responding percentage of cancer deaths to total deaths over years of age for Brookfield and thereby obtain the excess above rmal in Brookfield.

So far as Brookfield is concerned, this assumption holds absolutely e, as no deaths from cancer under 30 years of age were recorded.

Tables IV and V contain the figures of this calculation. There is shown a remarkable agreement of the figures for the State of New York, the census registration area of the United States and the New England States. Thus the percentages of cancer deaths to all deaths over 30 years of age for these three areas are, respectively, 6.04, 6.17 and 6.25. So nearly identical are these percentages that one must be impressed, I think, with the view that no element of chance, but rather a general law of proportion, determines them; i. e., determines a standard of normal.

The marked variation of the figures for Brookfield* from this standard of normal is striking and at once determines the excess over normal of the Brookfield cancer mortality. Thus, as shown in Table V, the ratios of the Brookfield figures to the figures for New York, the United States and the New England States, for all ages over 30 years, are, respectively, 2.08:1, 2.04:1, and 2.01:1, i. e., almost exactly double. And in estimating these ratios I have not used my own determination of the number of deaths from cancer in Brookfield (84 cases) but rather the figures (70 cases) in the official records of the State Board of Health, for manifestly in comparing rates such rates must have been based on a tolerably uniform system of collection and classification in order to be properly compared. And that there may be no misunderstanding of what follows hereafter in this paper I shall say here, once for all, that in comparing the Brookfield cancer death-rate with the corresponding cancer death-rates of other places I have made all estimates of the Brookfield rate on the basis of the 70 deaths from cancer, as given in the official records of the State

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* The law of proportion, determining the standard of normal of cancer deaths to total deaths over the age of 30 years, is strictly applicable only to *similar large bodies of population whose mortality statistics are classified on a common basis.* For with a small population variations from year to year, due to exceptional local conditions, might introduce an appreciable error, which would not be the case with large aggregates of population in which the variations of the component parts are leveled in the average for the whole. In the case of Brookfield, however, the mortality statistics were classified by the State Department of Health on the same basis used for the entire State of New York, and any exceptional variation for a single year has been avoided by taking the mean for a period of fifteen years.

Board of Health, and not on the 84 cases as determined by my special investigation.

We find, therefore, that the gross cancer mortality of Brookfield, for all ages, is materially reduced by making due allowance for longevity, and that, after making this allowance, the Brookfield cancer rate is still 2.08 times the corresponding rate for the entire State of New York, which (latter) may be taken as the standard of normal. Therefore, of the 70 deaths from cancer in Brookfield, only 33.5 (12.61 : 6.04 : : 70 : x = 33.52) can be accounted for by longevity, and 36.5 remain to be explained by factors other than longevity.

Other factors than longevity influencing cancer mortality in Brookfield.— To account for this excess of 108 per cent, or 36.5 cases above the normal, after making allowance for longevity, we must seek other factors. Evidently among such other factors *error in diagnosis* must be carefully considered.

Error in diagnosis as a factor in the cancer mortality of Brookfield.—Among the active practitioners of medicine in Brookfield I found several conscientious and intelligent physicians, men above the professional ability usual in such a place. Of some others, however, this may not be said. There were physicians who had signed death certificates whose knowledge of medicine was less than meager and whose ideas of diagnosis would have little value.* Moreover, there were certain "cancer specialists" who professed to cure cancer, without the use of the knife, by means of secret preparations applied locally and administered by mouth as "blood cures." The diagnosis of cancer was confirmed in one case by microscopic examination, and in 11 cases by post-mortem section, making only 14 per cent of the diagnosis of cancer determined by means that would be regarded as satisfactory. My confidence in the approximate accuracy of the diagnosis in a part of the cases diagnosed as cancer was therefore shaken, and I determined to ascertain if possible what part of

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*As an example of diagnosis, note the following verbatim extract from one of the death certificates, signed by two physicians: *Immediate cause of death:*—"Rupture of a hydatid into stomach which drowned her by strangulation (5 minutes)."

the entire 70 cases could be accounted for by excessive error in diagnosis.

It might seem, on first thought, that such a determination with any degree of accuracy could not be made. However, I found a means to this end that I believe will be accepted as reasonably satisfactory. It depends on the principle of comparing the Brookfield cancer mortality with that of an adjoining similar town, *in both of which places the factors of longevity and error in diagnosis were relatively equal and, therefore, negligible*, as a result of which comparison the excess of cancer mortality in Brookfield over that in the adjoining town would represent the part of the Brookfield cancer mortality that was due to factors other than longevity and excessive error in diagnosis. As the part attributable to longevity alone has already been determined, the part due to excessive error in the diagnosis (above the average amount of error in the whole State) can be found by subtraction. The principle of this method cannot be criticised, provided the condition of similarity of the two towns in the respects noted to be a fact. It remains for me, therefore to prove the similarity in the points named of Brookfield and the adjoining town selected for the purpose of the comparison.

The town selected for comparison is Plainfield,* immediately adjoining Brookfield on the east. All that I have said about Brookfield, as to its general character, topography, cultivation, occupation of its people, low birth-rate, emigration of its youth, declining population, longevity of the people and qualifications of the physicians, applies with equal force to Plainfield. The two towns are identical in all these respects. As to longevity and qualifications of the physicians, I must be more specific in order to fortify the general assertion just made. The population of Plainfield was in 1890, 1,025; in 1900, 897 — a loss of 12 per cent. Brookfield lost in the same period 16 per cent. The annual death-rate per 1,000 of population during the period 1886-1900 was in Plainfield, 15.4; in Brookfield, 15.5. The average age of death from all causes of death during this period was in Plainfield, 55.1 years; in Brookfield, 54.4 years — almost identical. It is apparent, therefore, that so far as longevity is concerned in the influencing the cancer mortality there is no essential difference between the two towns. As to the qualifications of the physicians as bearing on the amount of error in diagnosis in each place, *the physicians of the two towns are the same.* The two towns together constitute a single unit of territory in the practice of the physicians. One death certificate only out of 16 in Plainfield, in which cancer was assigned as the cause of death, was signed by a physician whose name did not also appear on death certificates of cancer cases in Brookfield. It is therefore plain that whatever degree of error in diagnosis entered as a factor into the cancer mortality of Plainfield must have effected equally the cancer mor-ality of Brookfield.

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* Plainfield is not one of the specified localities for which separate mortality statistics are given in the Monthly Bulletin of the New York State Board of Health. I therefore was compelled, in order to obtain the required data, to go through the official register of deaths in the town clerk's office and extract therefrom the facts that I needed. In the deaths from cancer accepted by me I included only such as would have been assigned to cancer as the cause by the State Board of Health. The cancer mortality of Plainfield thus determined may therefore properly be compared with that of Brookfield.

Having thus demonstrated the proposition that the towns of Brookfield and Plainfield are exactly similar in respect to the influence of both longevity and error of diagnosis on the assigned ancer mortality of each place, I shall now proceed to compare heir respective cancer mortalities in order to determine the exess of the Brookfield cancer mortality over and above that of Plainfield, and thus the exact portion of the Brookfield cancer mortality that must be assigned to causes other than longevity and excessive error in diagnosis combined.

The per cent of cancer deaths to total deaths over the age of 30 years in Brookfield was found to be 12.61 (70 in 555); the corresponding per cent for Plainfield I found to be 8.64 (16 in 185). If two of the 16 deaths from cancer in Plainfield be excluded from consideration for the purpose of this calculation because these two cases only among the 16 had a history of cancer in other members of their respective families, the per cent of cancer deaths to total deaths over 30 years of age in plainfield is reduced from 8.64 to

7.56. I have excluded these two cases from present consideration in order to exclude from the Plainfield figures any influence of heredity, for reasons that will be appreciated when we come to the question of heredity as a factor determining the development of cancer in families with a cancer history. Comparing then these percentages for Brookfield and Plainfield, we have the ratio: 7.56 : 12.61 : : 1.00 : x (= 1.667).* The Brookfield cancer mortality is thus found to be 1.667 times that of Plainfield, after allowing in each for the combined influence of both longevity and excessive error in diagnosis; i. e., the Brookfield cancer mortality (70 cases) is 1.667 times the cancer mortality assignable to the combined influence of longevity and excessive error in diagnosis. Hence the following equations:

$$1.667 : 1.000 : : 70\ x\ (= 41.9 \text{ cases})$$

$$1.667 : 0.667 : : 70\ x\ (= 28.0 \text{ cases})$$

Therefore, 41.9 out of the entire 70 cases of cancer in Brookfield can be accounted for by longevity and excessive error in diagnosis. As 33.5 cases were determined as the number due to the influence of longevity alone, therefore, 8.4 cases may be assigned to excessive error in diagnosis over and above the average error in the State of New York as a whole. There remain at least 28 cases not due to these factors, and, therefore, to be accounted for by other influences.

What factors, other than longevity and error in diagnosis, have operated to produce the excess of cancer mortality in Brookfield? — Heredity and consanguinity.— In answering this question I realize that I have the most difficult part of my task to perform, in which I may not expect that my own conclusions will meet with the approval and acceptance of all. I must, therefore, ask the indulgence of those who disagree with me when I assert my own belief that heredity and consanguinity are the special factors that have operated with peculiar force in Brookfield to produce the excess of cancer mortality over that attributable to the factors already considered.

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* This ratio and the deductions therefrom depend on the assumption that the entire Plainfield cancer mortality, except the two cases with a family history of cancer, is explained by the two factors, longevity and excessive error in diagnosis. Heredity, as an influence, has been excluded, so far as possible, for I made exhaustive inquiry into the family histories of all the cases and obtained a positive history of cancer in only two of the 16 cases, and these two cases I rejected in making the calculations. I believe, therefore, that the assumption made is close to the truth. However this may be, we have at any rate given to excessive error in diagnosis the maximal credit possibly due to it as a factor. Therefore, the 28 Brookfield cases is the minimum attributable to factors other than longevity and excessive error in diagnosis.

The truth of the assumption of a direct influence of heredity in determining the development of cancer in families can be neither absolutely proved nor disproved in the present state of our knowledge. It is conceivable that multiple cases of cancer in a family may be the result of (1) hereditary predisposition, (2) longevity, by which the various members of a family live to the cancer period of life, (3) mere chance,* (4) infection with a hypothetical parasite, (5) other unknown etiological factors, or (6) any combination of two or more of these several elements. I shall not in this place engage in the controversy that is now waging over the etiology of cancer. The opinion held by each on the chief question involved in this controversy will naturally influence his answer to the question whether any part of the Brookfield cancer mortality may have depended on the influence of heredity. I would have no bone of contention to pick with anyone were he to attribute to this factor no part whatever of the excess of cancer mortality in Brookfield. For my own part I have no hesitation in asserting my belief in the reality of a heredity influence in determining the development of cancer in certain families. Holding this view, then, I should attribute to the influence of hereditary predisposition to cancer the excess of cancer in Brookfield that is not otherwise explained, because, as will be seen directly, a family history of cancer was a most prominent and noteworthy feature in a large part of the Brookfield cancer cases, and because no other special cause could be found to explain the local excess of cancer in Brookfield.

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* For an able discussion of the possible bearing of chance on the occurrence of several cases of cancer in one family, see King, quoted in Newsholme's *Vital Statistics*, 3d edition, pp. 248-249.

In order that full justice be done to the divergent views of etiology, I may add that the acceptance of heredity as a factor in cancer mortality does not necessarily commit one against the parasitic theory, for it is conceivable that hereditary predisposition to cancer may be simply hereditary susceptibility to infection with a hypothetical cancer parasite according to the analogy of certain other diseases. On the other hand, heredity may represent a congenitally transmitted tendency to a special cell proliferation — i. e., cancer — independent of any special infection. The ultimate explanation of heredity in cancer production may, therefore, be considered an open question.

The relation of family history of cancer to certain of the Brookfield cases of cancer is shown in Table VI. This table includes only such of the Brookfield cases in which it was practicable in the short time at my disposal to work out family histories and genealogies to a certain extent in the first and sometimes the second and third generations. I do not assume to exclude in many of the cases not mentioned in this table similar relations, for I was limited in time and opportunity to about two weeks' study, and in this time I had much more than such relations to investigate. Twenty-seven of the 70 Brookfield cases of cancer are included in this table. Of the remaining 43 cases not included, in many no special inquiry was made; in others the information obtained as to family history of cancer, multiple cases in one house, etc., was either indifferent or negative (denying such relations). It is apparent, therefore, that the relations shown for the cases mentioned in the table may not logically be assumed to hold for the larger number of cases not thus mentioned. Nor would I give the impression that the facts noted in Table VI in regard to the Brookfield cancer cases therein mentioned are in any sense complete or exhaustive of the subject. They represent simply the facts that I succeeded in obtaining in a somewhat cursory and hurried investigation. For much of this information I am indebted to Dr. H. Clift Brown, of Brookfield, whose courteous and generous assistance I take pleasure in acknowledging. I am also indebted for material assistance to Dr. O. L. Southworth, of Plainfield; Dr. O. W. Burhyte, of Brookfield, and Dr. C. H. Chesebro, of Unadilla Forks.

Twenty-seven of the entire 70 Brookfield cancer cases (38.5 per cent.) are included in Table V. *Of these 27 cases, 23 show a history of cancer in other closely related members of their families, and only four fail to show other family cases.* In one family, for a marked example, no fewer than seven cases of cancer occurred in three generations, four of them being in a single generation, and all the seven victims, except two, living and dying in different towns. One can hardly fail to be impressed by the figures cited and even more by a perusal of the table of facts from which these figures are summarized. To some it may seem no mere coincidence that 23 cases are cited in which a family history of cancer was demonstrated, and that only 28 of the Brookfield cancer cases were left to be accounted for by factors other than longevity and error in diagnosis. These numbers are very nearly equal, and the equality might be even more exact were the family histories of the other Brookfield cancer cases known. I, therefore, submit to the judgment of those interested the decision of the question whether heredity really is the factor that determined the excess of 28 cases in the cancer mortality of Brookfield over and above the possibility of explaining by reference to longevity and error in diagnosis.

Consanguinity, with reference to heredity, must be taken into account in Brookfield. For not only has there been no infusion of new blood in the people of this small country town, but a considerable portion of the population has for generations belonged to a strict religious sect known as *Seventh Day Adventists,* among whom there has undoubtedly occurred much inbreeding as evidenced by the names of parents in the death certificates and by information gleaned by conversation with the people.

Before dismissing the subject of heredity and consanguinity, I wish to state a few further facts in support of the view that these factors are the real cause of the excess of cancer mortality in Brookfield. Compared with the neighboring country towns, which resemble Brookfield in their general characteristics,* Brookfield stands pre-eminent in its cancer mortality, though all of these towns show an increased cancer mortality compared with the entire State of New York as a standard. The per cent of cancer deaths to all deaths for all ages was in the State of New York, 3.42 (1900); in Brookfield, 9.73 (1886-1900); in Plainfield,* east of Brookfield, 6.0 (1886-1900); in Bridgwater,* northeast of Brookfield, 5.1 (1888-1901); in Edmeston,* southeast of Brookfield, 5.1 (1887-1901), and in Hamilton,* west of Brookfield, 5.1 (1887-1900). The towns surrounding Brookfield are, therefore, fairly uniform in their cancer rate as opposed to Brookfield. In none of these towns was I able by personal investigation to find any pronounced predominance of a family history of cancer *within recent years.* I make this last qualification because in the adjoining towns of Plainfield and Edmeston I did obtain a pronounced family history of cancer in certain families living in a limited area of the town for many years ago; but such family cases had not occurred to any marked extent within the period of my investigation, 1886-1900. The sect of the Seventh Day Adventists was practically confined to Brookfield.

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* "Clubfoot disease" in plants prevailed equally in Brookfield and the surrounding towns.

"*Cancer houses.*"— I was able to obtain a history of two or more cases of cancer occurring in each of nine houses in Brookfield. Such houses have been called by writers "cancer houses," and have been cited in corroboration of the theory of a parasitic origin or etiology of cancer, on the ground that they represented instances of local infection. An analysis of the facts presented in Table VI shows that, of the nine "cancer houses," in only four were the multiple cases occurring therein non-related by blood, and of these four, in only one instance was there an absence of a family history of cancer in the immediate family for at least one member of the group in the same house. These facts are better shown by Table VII, adapted from Table VI, and support still further a belief in the influence of heredity.

"*Cancer foci.*"— I was able to discover no special locations or spots of concentration of cancer in Brookfield, unless the houses with multiple cases be so regarded.

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*In Plainfield, Edmeston and Bridgewater, towns not specified in the Monthly Bulletin of the State Board of Health, I obtained the rates by a personal investigation of the registers of death. The rate for Hamilton is calculated from the statistics of the Monthly Bulletin.

Husband and wife cases.— With reference to this interesting relation of cancer, four instances were noted. In two the husband and wife lived together and died in the same house; in two they lived together during married life and died in different houses. In the former two instances the intervals separating the deaths of husband and wife were two and five years; in the latter two instances, three and eight years, respectively. Of these four couples, a family history of cancer in the immediate family for at least one member of the couple was absent in only one case; in one instance there was a family history of cancer for each member of the couple, and in two instances for one member only. There were no instances of cancer of the genitals among these cases.

Conclusions.— From the foregoing considerations I have reached the following conclusions: Brookfield is credited with a remarkably high cancer mortality in the official statistics of the New York State Board of Health. An analysis of the cases shows that a considerable portion of the excess is explained by the two factors, longevity and error in diagnosis, and the remainder is probably due to the marked influence of heredity and consanguinity.

TABLE I.— *Anatomical Location of Cancer, by Sex, in Brookfield Cases for Period,* 1886-1900.

			Males	Females	Total
External		Face	2	......	2
		Nose	1	......	1
		Hand	1	......	1
		Axilla	......	1	1
		"Skin"	......	1	1
Sex organs and breast	Male	Penis	1	......	1
		Prostate	2	......	2
	Female	Uterus	......	10	10
		Ovary	......	1	1
		Breast	......	8	8
Alimentary canal and accessory organs	Upper	Mouth	......	1	1
		Jaw	2	......	2
		Larynx	......	2	2
	Abdomen	Stomach	16	17	33
		Liver	5	3	8
		Intestine	4	3	7
		Abdomen	1	2	3
Total			35	49	84

TABLE II.—*Age Distribution of Deaths from All Causes and of Deaths from Cancer in Brookfield, Period,* 1886-1900.

	All ages	–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49
Total deaths	719	80	10	13	22	13	24	21	24	20	24
Cancer deaths......	84	0	0	0	0	0	0	3	5	6	5

	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	Unknown
Total deaths..........	28	22	63	64	79	72	80	41	14	3	2
Cancer deaths	4	9	8	17	10	7	6	3	1	0	0

TABLE III.—*Per Cent* of Deaths from All Causes and of Deaths from Cancer in Different Age Periods for Brookfield for Period,* 1886-1900, *and for the United States Census Registration Area, for* 1900.

	AGE PERIOD						
	1-19	20-24	25-34	35-44	45-54	55-64	65 and over
Total deaths:							
Brookfield........................	17	1	6	6	7	11	49
United States census registration area.	37	4	9	9	8	9	21
Cancer deaths:							
Brookfield........................	0	0	3	14	10	20	52
United States census registration area..	0	0	3	12	22	26	33

* Percentages expressed in whole numbers, fractions omitted.

TABLE IV.— *Per Cent of Cancer Deaths to Total Deaths at Different Age Periods.*

PLACE	Time	All ages.	All ages over 30	30–39	40–49	50–59	60–69	70–79	80 and over
New York State[a]........	1900	3.42	6.04	2.7	6.8	8.8	8.3	5.4	2.6
United States census registration area[a]........	1900	3.45	6.17	2.8	7.1	9.3	8.1	5.4	2.8
New England states[b]....	1895	3.53	6.25	3.09	6.14	9.77	8.36	5.52	2.79
Brookfield, 70 cases[c]	1886–1900	9.73	12.61	......	......	......	......	......	......
Brookfield, 84 cases[d]	1886–1900	11.68	15.13	17.7	25.0	25.0	19.6	11.2	7.2

[a] Figures compiled from the United States census.

[b] Figures obtained from "Statistics of Cancer in Massachusetts" by W. F. Whitney, M. D., published in the Thirty-second Annual Report of the State Board of Health of Massachusetts.

[c] Figures based on the 70 cases of cancer, as given in the Monthly Bulletin of the New York State Board of Health.

[d] Figures based on the 84 cases of cancer, as determined by my personal investigation.

TABLE V.—*Per Cent of Cancer Deaths to Total Deaths, for All Ages and for All Ages over 30, for Brookfield Compared with New York State, United States Census Registration Area and New England States, with Ratios.*

	Brookfield[a]	New York State[b]	Brookfield[a]	United States census registration area[b]	Brookfield[a]	New England States[c]
All ages..........	9.73:3.42.	Ratio, 2.84:1.00	9.73:3.45.	Ratio, 2.82:1.00	9.73:3.53.	Ratio, 2.75:1.00
All ages over 30...	12.61:6.04.	Ratio, 2.08:1.00	12.61:6.17.	Ratio, 2.04:1.00	12.61:6.25.	Ratio, 2.01:1.00

[a] Percentages based on 70 cases of cancer in period, 1886-1900, as given by the Monthly Bulletin of the New York State Board of Health.
[b] Percentages based on United States census for census year 1900.
[c] Percentages obtained from "Statistics of Cancer in Massachusetts," *loc. cit.*

LE VI.—*Certain Groups of Cancer Cases — Family Groups, Cancer House" Groups, Husband and Wife Groups, Etc.**

GROUP I.

r of th	NAME	Age	Organ	Relationship				Remarks
. . . .	Mrs. E. G.	80	Hand	Mother				
[1] . . .	Mr. H. G.	65	Face	Children	Brother			Two, same house.
[2] . . .	Mrs. L. G. B.	80	Mouth		Sister			
[3] . . .	Mrs. N. G. W.	70	Stomach		Sister			
. . . .	Mrs. S. G. B.	88	Face		Sister	Mother		
[4] . . .	Mr. A. B.	73	Face			Sons	Brother	
a . . .	Mr. M. E. B.	70	Stomach				Brother	

ived in Utica, N. Y.
ived in Wisconsin.
ived in Utica, N. Y.
ived in Hamilton, N. Y.

GROUP II.

r of th	NAME	Age	Organ	Relationship				Remarks
a . .	Mrs. P. S	74	Axilla	Wife				Three, same house.
a . .	Mr. P. S.	76	Stomach	Husband	Brother			
. . .	Mrs. M. J.	57	Stomach		Sister			
a[1] . .	Mrs. W. S.	68	Stomach		Brother			Two, same house.[1]
a[1] .	Mrs. H. S.	67	Stomach			Niece		
a .	Miss P. L.	72	Mouth			Aunt.		

r. W. S. developed cancer in a certain house, but moved out of this house and died else-
e one year later. Mrs. H. S. moved into this house directly after the death of Mr. W. S.;
loped cancer in a few months and died in the house within eighteen months.

GROUP III.

r of ath	NAME	Age	Organ	Relationship				Remarks
[1] . . .	Mr. J. H.	80	Face	Father.				
[2] . . .	Mr. J. H., jr.	60	Stomach	Children	Brother.			
[1] . . .	Mr. I. H.	77	Face		Brother.			
[1] . . .	Miss E. H.	86	Stomach		Sister.			
a . .	Mr. G. W. H.	84	Stomach		Brother.			

ll three lived in different houses in Plainfield, N. Y.
ied in Smyrna, N. Y.: developed cancer in Plainfield in a different house from the others.
ach case that is included in the summary of 70 cases, for Brookfield, for the period, 1886–
. is marked *a*. All cases, not marked to the contrary, died in different houses.

GROUP IV.

r of th	NAME	Age	Organ	Relationship			Remarks
a . . .	Mrs. S. N. A.	84	Stomach	Mother			
a . .	Mrs. H. M. C.	69	Stomach	Daughter	Wife.		
a . .	Mr. H. M. C.	66	Stomach		Husband	Brother.	
a . . .	Mr. J. A. C.	60	Stomach			Brother.	

GROUP V.

Year of death	NAME	Age	Organ	Relationship				Remarks
1885	Mrs. L. E. C.	66	Uterus	Sister	....	....	....	Three, same house.
1897*a*	Mrs. L. E. B.	66	Stomach	Sister	....	....	....	
Living	Miss T. E.	..	Breast	Sister	....	....	....	
.......[1]	Mrs. E. C.	..	Colon	Sister.				

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[1] Lived in North Litchfield, N. Y.

GROUP VI.

Year of death	NAME	Age	Organ	Relationship				Remarks
1900*a*	Mrs. S. F. B.	78	Liver	Sister	....	....	....	Two, same house.
1890*a*	Mr. P. F.	84	Face	Brother	Father	....	....	
1901[1]	Dr. A. D. F.	..	Lip	....	Son.			

---

[1] Had cancer of lip removed in 1891; died subsequently of apoplexy.

GROUP VII.

Year of death	NAME	Age	Organ	Relationship				Remarks
.......[1]	Mrs. W. M.	..	Breast	Sister	Aunts.			
.......[2]	Mrs. W. T.	..	Uterus	Sister				
1897*a*	Mrs. A. T. M.	49	Breast	....	Niece.			

---

[1] Lived in Madison, N. Y.
[2] Lived in Sangerfield, N. Y.

GROUP VIII.

Year of death	NAME	Age	Organ	Relationship				Remarks
.......[1]	Mr. A.	..	....	Father.				
.......[1]	Mr. A.	..	....	Sons	Brother.			
1887*a*	Mr. B. J. A.	53	Stomach		Brother.			

---

[1] Did not live in Brookfield.

GROUP IX.

Year of death	NAME	Age	Organ	Relationship				Remarks
1866	Mr. R. C.	56	Lip	Father	....	....	....	Two, same house.
1895*a*[1]	Mrs. F. C. P.	51	Stomach	Daughter	....	....	....	

---

[1] Lived with her father until his death; subsequently lived eighteen years in Vermont; returned to her father's house in Brookfield in 1891 and within five months developed cancer

GROUP X.

Year of death	NAME	Age	Organ	Relationship	Remarks
1879	Mrs. C.	..	Uterus	Mother	Two, same house.
1899a	Mrs. M. C. B.	59	Uterus	Daughter	

GROUP XI.

Year of death	NAME	Age	Organ	Relationship	Remarks
1894a[1]	Mrs. M. I. B.	35	Stomach	Wife	Two, same house.[2]
1896a	Mr. M. I. B.	43	Stomach	Husband	

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[1] There was a family history of cancer in Mrs. B's family.

[2] The house was new in 1889.

GROUP XII.

Year of death	NAME	Age	Organ	Relationship	Remarks
1892a	Mr. P. W.	63	Stomach	Not related.	Two, same house.
1891[1]	Mr. H.	..	Stomach		

---

[1] Mr. H. took Mr. W.'s blacksmith shop immediately after the latter's death and developed cancer within one year. He left Brookfield and died elsewhere. Nothing known of family history of either.

GROUP XIII.

Year of death	NAME	Age	Organ	Relationship	Remarks
. . . . .[1]	Mr. G. C.	..	Lip	Brother.	
1899a	Mrs. R. C. R.	80	Stomach	Sister.	

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[1] Lived in another county in New York. He had cancer of the lip removed in 1890 and died subsequently from another cause.

GROUP XIV.

Year of death	NAME	Age	Organ	Relationship	Remarks
1888a	Mr. A. A. B.	69	Stomach	Brother.	
1891[1]	Mrs. J. B. S.	67	Stomach	Sister.	

---

[1] Lived in Columbus, N. Y.

GROUP XV.

Year of death	NAME	Age	Organ	Relationship				Remarks
1889a...	Mr. J. A. S....	69	Face.....	Husband.				
1887a[1] ..	Mrs. J. A. S...	67	Ovary ...	Wife.				

[1] After husband's death, moved to another house.

GROUP XVI.

Year of death	NAME	Age	Organ.	Relationship				Remarks
1899a...	Mr. T. P........	77	Liver.. ..	Brother..				
1899a...	Mr. J. P.........	85	Hand.....	Brother..				

TABLE VII.—*Cancer Houses—Multiple Cases of Cancer Occurring in the Same Houses in Brookfield, Classified with Reference to Consanguinity and to Family History of Cancer.*

"Cancer Houses".......	Two cancer cases each..	7	Cases related by blood.........	4		
			Cases not related by blood......	3	Family history cancer, both sides	1
					Family history cancer, one side only........	1
					No family history cancer.	1
	Three cancer cases each..	2	All three related by blood......	1		
			Two related by blood, the third not related....	1		

February 1, 1903.

Cancer District in the Towns of Plainfield and Edmeston, New York.

By Irving Phillips Lyon, M. D.

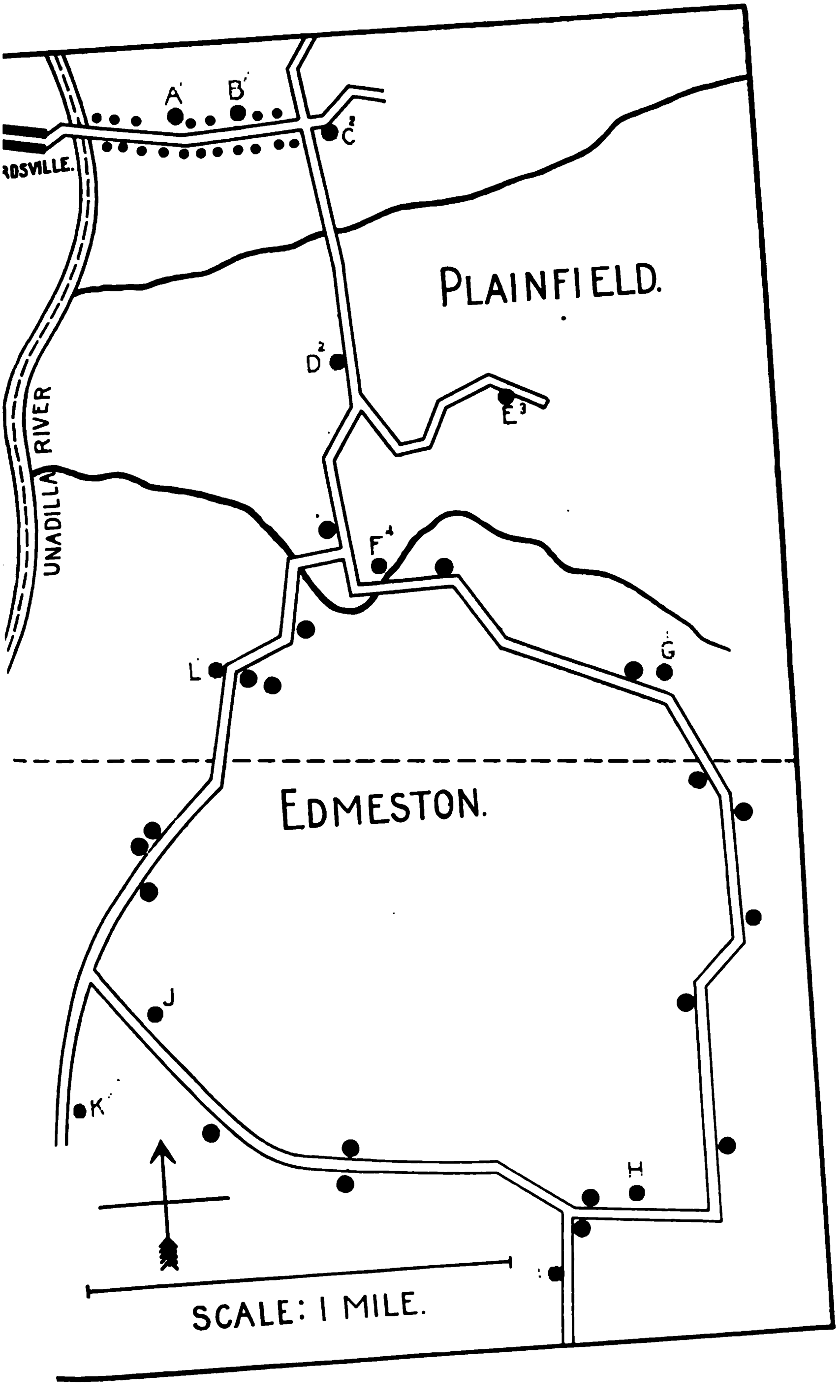
While engaged in studying the cancer distribution in the town of Brookfield my attention was drawn by certain physicians to the fact that quite a cancer focus had previously existed just across the town line of Brookfield in the towns of Plainfield and Edmeston, Otsego county, and in consequence I made an investigation of the subject on the spot.

The area embraced in this cancer district is about 2.5 x 1.5 miles, in a rough, hilly farming country. The accompanying road map shows the location of every house in this district, indicated by black dots for houses in which no cases of cancer have occurred within the recollection of the older physicians and inhabitants, and by red dots for cancer houses. Each cancer house is further marked on the map for the number of cancer cases known to have developed in it, and is given a letter for the purpose of reference.

It will be seen that this map shows twelve cancer houses, including nineteen cases of cancer, in the limited territory represented — a much greater number than known in other districts of similar size and population in the neighboring country. The dates of death of these cases (Table I) indicate that cancer occurred more frequently years ago than recently. Thus 10 of the 19 cases were before 1875 and 15 before 1885, only four having occurred in the period 1885-1900. It will be noticed also that the ages at death were generally quite advanced.

I made a rather careful inquiry into the family histories of the persons who had developed cancer in these houses and found, as given in detail in Table I, only four cases among the 19 that failed to have a positive history of cancer in other members of their families, and of three of these four cases little or nothing as to family history could be ascertained. In view, therefore, of the great preponderance of a further family history of cancer among these cancer house cases, I am of the opinion that *this cancer district represents a concentration of cancer families rather than cancer houses.* For the benefit of those who deny the influence of heredity in determining the development of cancer in families, I would make the same reservations and suggestions indicated in the preceding report on the cancer mortality of Brookfield.

In conclusion, I desire to acknowledge my indebtedness to Dr. O. L. Southworth, of Plainfield, for much assistance in working out the details of this cancer district.


A
B
C
RDSVILLE.
PLAINFIELD.
D
E
UNADILLA RIVER
F
G
L
EDMESTON.
J
K
H
SCALE: 1 MILE.

Year of death	NAME	Age	Organ	House	Relationship				Remarks
1868....	Mr. S. D.......	70	Stomach...	E	Husband..	Brother...	Uncles..	Granduncles..	
1869....	Mrs. S. D......	68	Stomach...	E	Wife......				
1884....	Mr. J. D.......	91	Stomach...	L	....	Brother...			
1882....	Mrs. S. D. T....	55	Stomach...	H	Cousin....	....	Nieces.		
1887....	Mrs. H. E McI.	53	Abdomen..	..	Cousin....	....			
1891....	Mrs. S. D.......	55	Breast.....	J	Mother.				
1899....	Dr. E. D........	40	Face ...	Another town	Son	....	....	Grandnephew	
1884....	Mrs. J. T.......	77	Breast.....	E	Not related..	....	....	....	No family history of cancer.
1850....	Mr. J. H., Sr...	80	Face......	G	Father.				
1870....	Mr. J. H., Jr...	60	Stomach...	D	Children.	....	....	....	Developed cancer in Plainfield; died in Smyrna, N. Y.
1880....	Mr. I. H.......	77	Face......	..					
1885....	Miss E. H......	86	Stomach...	..					
1892....	Mr. G. W. H...	84	Stomach...	Brookfield.					
1861....	Mr. W.........	85	Face......	F	Husband..	Parents.			
1870....	Mrs. W........	95	Uterus....	F	Wife......				
1873....	Mr. J. B. W....	80	Stomach...	F	....	Children.			
1892....	Miss S. W......	85	Face......	F	....				
1862....	Mr. H. C.......	Old	Stomach...	D	Father.				
1890....	Mr. G. C.......	68	Lip	Another town	Children.				
1899....	Mrs. R. C. R...	80	Stomach...	Brookfield.					

TABLE I—(*Continued*).

Year of death	NAME	Age	Organ	House	Relationship		Remarks
1855....	Mr. S. W......	60	....	....	Father.		Father and son lived one mile apart; cousin's fathers were brothers.
1896....	Mr. H. J. W....	66	Stomach...	B	Son.......	Cousin.	
1889....	Mrs. L. A. C....	47	Stomach...	....	....	Cousin.	
1835....	Mr. J. C.......	64	Rectum...	C	Father.		Mr. J. C. and Mrs. C. H. C. W. died in different houses built on exactly the same spot.
1877....	Mr. F. C.......	61	Stomach...	A	} Children.		
1884....	Mrs. C. H. C....	75	Uterus....	C			
1860....	Mrs. D. W.....	50	Stomach,..	K	Sister.		
1868....	Mrs. H. W.....	65	Breast.....	Brookfield.	Sister.		
1895....	Mrs. I. T.......	74	Uterus....	I			Family history of cancer.

February 1, 1903.

A Report Upon the Physics and Therapeutic value of Kathode and Ultra-Violet Rays, with References to the Electro-Magnetic Theory of Light.

AN ATTEMPT TO MORE CLEARLY DEFINE THE GENERAL CHARACTER OF THESE RECENTLY INTRODUCED AGENTS IN THE TREATMENT OF CANCER.

BY ROSWELL PARK, M. D., LL. D.

Within the past eighteen months there has been such general interest aroused in the treatment of certain cancerous and other infectious diseases by kathode and ultra-violet rays, and so many have been induced to experiment therewith that it has seemed to me wise to study more carefully the nature of these agents in order that we may more fully comprehend their physical characteristics before employing them too indiscriminately.

It is very certain that but a small proportion of the physicians who are purchasing more or less expensive appliances, to whose uncertain effects they are subjecting their patients empirically and often rashly, have an adequate comprehension of what they are doing or how doing it. This report is a brief epitome, then, of recent researches into the physics of certain widespread or universal phenomena with which, it seems to the writer, all should be acquainted who purpose taking up and practicing the so-called X-ray or Finsen light treatment of cancer. It is not intended to present here directions for their use, nor to report cases, though to give it a certain "practical" character a few conclusions are appended. *It is too early yet to report cases.* Considerable time must yet elapse before we can speak with certainty as to the actual value of these new methods. Meantime, while waiting for these results, we can accumulate experience and we can broaden our acquaintance with the agents to which we are resorting. It is hoped that this report will be of assistance in this direction. The subject is approached, as will be seen, with this purpose distinctly in view.

Periodically in the history of events, and in the advance which science is constantly making, it has become necessary to not only stop and, as it were, take account of stock, but to entirely revise present notions; sometimes in accord with entirely newly-discovered facts, at other times in accord with older and perhaps abandoned views. This is true at the present time, with regard to the most elementary notions concerning the physical character of light and electricity.

The primary concepts of science have included the existence of matter in an incomprehensible minute division, each tiny particle being spoken of as an atom. Some such concept was absolutely necessary for purpose of measurement and calculation and as a basis upon which to build a superstructure. While no one ever has seen, and probably no one ever will see an atom, nevertheless, the existence of atoms has been universally conceded by all scientists as a necessary postulate of thought and computation. Scientists have even gone so far as to calculate the size of the atoms, and Lord Kelvin figures the average atom as one twenty-five millionth of an inch in diameter. This is not merely the scientific use of the imagination, as Tyndall used to say, but is based upon calculations which have very much to support them and practically nothing to weaken them, save the lack of power of our finite minds to comprehend the infinitely small. But the existence of atoms of this size as a postulate of physical science does not supply the demands now made upon it, and of late men have been seeking a demonstration of the existence of particles still smaller by whose activity and ceaseless energy certain natural phenomena may be explained. Both the size and the activity of these ultimate particles transcends the limits of our imagination, yet they are necessary adjuncts to such conceptions of them as we can form. The ordinary conception of an atom has been that in one cubic centimeter of gas there are twenty million, million, million ($2x8^{10}$) molecules. This was Loschmidt's estimate, and it has been confirmed independently in several ways, among others, by the electrolytic method and by Lord Rayleigh's calculations concerning the opacity of the air.

The researches of Prof. J. J. Thompson, assisted by those of Sir George Stokes and Prof. Townsend, have now apparently established the existence of particles not larger than one-thousandth of the diameter of the atom whose size has just been stated, each of which is capable of carrying a tiny charge of negative or positive electricity; those carrying negative charges being those which most interest us here. It is a stream of these proceeding from the kathode which causes the Roentgen ray, instead of light rays vibrating in a lateral instead of a longitudinal direction, as was at first held. It will be seen that this is not far from accepting Crooke's fourth or radiant state of matter. The greenish phosphoescence of a Crooke's tube is due to the bombardment of the attenuated gas which it still contains by this stream of particles, which are now usually spoken of as *corpuscles.* Although it was at first held that this stream could not be deflected nor reflected, it is, nevertheless, true that it may be, at least in part, deflected by an electrostatic or magnetic field, if only the vacuum be high enough.

These corpuscles are also given off by incandescent metal, by cold metal when illuminated by the ultra-violet ray, and by radium. Everywhere when pressure of gas is relatively low, i. e., when there is a vacuum, and when the corpuscles find few atoms to which to adhere and give up their electric charges, it is found that they are the carriers of negative electricity.

Thompson has recently shown (Popular Science Monthly, August 19, 1901) that there is a remarkable difference between negative and positive electricity, for the latter instead of being associated with a constant mass (i. e., corpuscles) one-thousandth the size of a hydrogen atom, is connected with a mass of the same order as an ordinary molecule, varying, of course, with the gas in which electrification takes place. That is, the carriers of negative electricity are infinitesimally minute and invariable, while all the positive masses are larger and quite variable. This naturally suggests a view that these corpuscles themselves, or ions, constitute negative electricity and that positive electricity simply implies their absence from ordinary atoms. This takes us back to the old Franklinic view, that electricity comprised a fluid, and makes us think that in using the term electric fluid they were wiser than they knew, and that changes in the state of electrification are due to transportation from one place to another. It seems to be established that a body negatively electrified has its volume augmented, while positive electrification involving absence of corpuscles is accompanied by diminution of volume. Thus a charged body by virtue of its charge possesses proper mass apart from the ordinary matter composing it. All of which Thompson showed twenty years ago.

These corpuscles are not the atoms of a metal, but infinitely smaller bodies which are the same for all substances. Their failure to escape from a metal, or from the surrounding air or medium, is due to the fact that negative corpuscles are attracted by positive atoms, even by neutral, hence the fact that metals, especially some of them, are such great conductors. Under the influence of great heat or of the ultra-violet rays, the corpuscles seem to acquire enough energy to escape. Radium constitutes an exception to this statement since emanation or escape from it takes place as rapidly as $2x10^{10}$ times per second, or two-thirds as rapidly as light moves, while they have a very much more penetrating power. Since gas becomes a conductor when the corpuscles pass through it, but not when its pressure is reduced, we have an explanation of electrical phenomena occurring in our upper atmosphere, especially when its density and movements are controlled by such currents as are known to occur. Variations in the earth's magnetic field, and consequently in the compass, may thus be explained. The conception and acceptance of those views about corpuscles, which I have just summarized, have necessitated a complete revision of previous opinions. These corpuscles, considered to be not larger than one-thousandth of the size of hydrogen atoms, each bearing its charge of negative electricity, are known to be discharged with tremendous velocity:

1. From the negative electrode in a Crooke's tube, kathode rays.

2. From objects impinged upon by these kathode rays (X-rays).
3. From exceedingly hot bodies, such as incandescent metals.
4. From cold metals under the influence of the ultra-violet rays.
5. From the radio-active substance or element radium.

These corpuscles, or ions, passing through a gas produce other ions by collision with its molecules. These ions also with their peculiar electric properties serve as nuclei for the condensation of ordinary matter. It has been the particular service which the great Swedish physicist Arrhenius has rendered, that he has introduced this conception of the electro-magnetic properties of these ions into the theory of light, and has shown that while the ordinary properties of light may be considered as still amenable to the so-called laws under which they have so long been studied and classified, there still needs to be introduced into the subject this entirely new feature by which, along with the wave motion to which we have been so long accustomed, certain other physical features must be added.

Kepler and Newton, who regarded light as a corpusclar emanation, would perhaps appear to have considered it more wisely than they then realized. The hypothesis which they built up was superseded by the wave theory of Huygen's, upon which until very recently ali optical calculations were made. It does not disturb the practical value of these calculations if we assume that there is actual projection of matter in the direction of the light waves — matter probably of this corpusclar and elementary character which has the power of permeating space and all other material out of which the elements are probably built up, and which travels with simply inconceivable rapidity.

Let us now step aside for a moment from the consideration of therapeutics to see how well these views of Arrhenius fit the various facts regarding the nature of certain universal phenomena, since, if our primary concepts can be shown to be comprehensive and correct, it helps very much in limiting the field of inquiry to so relatively small a proportion as that of the therapeutic value of certain light rays. It is known that the surface of the sun evinces a wonderful repulsive force, which at least until now could never be satisfactorily accounted for. Aside from its heat-giving power, it is our principal source of emission of light. Until recently it had not been generally suspected that a ray of light could exert the faintest pressure, although Maxwell calculated in 1873 that sunlight at the earth's surface could exert a pressure of .6x10 to the minus tenth power in grams on every square centimeter (.592x10^{10}). Arrhenius, practically accepting this calculation, has shown that on the sun's surface this pressure amounts to 2.75 mg. for every square centimeter. If now one gram of water (i. e., 1 c. c.) weighing this amount at the earth's surface, could be carried to the sun's surface and weighed there, it would be found to weigh 27.5 grams; that is, the attraction of the sun would draw it in with 10,000 times the force with which the sun's light would tend to repulse it. But now if instead of a cubic centimeter, we consider a much smaller cube, the pressure on its base would diminish as the square of its edge, but its weight would diminish as its cube or volume. Consequently there must come a point when the pressure of light would balance the weight of an exceedingly small particle and finally exceed it. That is, as Cox has described it, these particles would behave as if gravity had become negative or reversed. This limit in minute size is approximately reached with a cube whose edge is one mikron in length; that is, one-thousandth of one milimeter.

Here we face this apparent paradox, that providing particles are small enough the pressure of light may be a much more active factor in their activities than their weight. This will explain, for instance, the long time required for the settling of very small particles in the air, and thus we may account for the red sunsets which were noted for so many months following the eruption of Krakatoa.

But nothing will so illustrate the terrific pressure and repulsive force to which these particles may be subjected as the motions, and especially the curvatures, of comets' tails, where the repellant force equals or far exceeds the gravitational or attractional force of the sun. Arrhenius and Bredichin have gone even so far as to calculate the size of the particles in the tails of certain comets, basing their calculations on the hypothesis that as comets approach the sun its intense heat provokes a violent eruption of hydro-carbon vapors, especially on its exposed side; that as the hydrogen boils off the vapors condense into minute drops or particles, of which the larger may drop back while the smaller are driven off from the sun, forming the comets' tails which have been so often seen pointing away from it. They calculate also that particles thus driven may traverse a space equal to the sun's diameter (850,000 miles) in a few minutes. If this be true, the formation of tails 120,000,000 million miles long within two days, as has been actually seen, is shown to be theoretically possible.*

Equally well are the phenomena of the corona and smaller prominences accounted for. The sun must project enormous quantities of vapor into space. If this vapor condenses into particles larger than the critical size above referred to (i. e., so that their weight prevents their projection by light), then they fall back toward the sun, giving rise to the prominences seen during total eclipses; if smaller, they are driven into space to enormous distances, and appear as the streamers of the corona. Particles of just the critical size may float in clouds, such as are also observed.

The zodiacal light may also be explained by the streams of electrically charged corpuscles which the sun emits, which, by

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*At a recent meeting of the American Physical Society in Washington (Dec., 1902) Nichols and Hull described an experiment by which something greatly resembling a comet's tail was obtained under conditions approximating those of nature. A powder consisting of a mixture of emery and puff-ball spores was placed in a vacuum tube constructed somewhat like an hour-glass. The vacuum was made as perfect as could be obtained, precautions being also used to get rid of mercury vapor. Upon pouring the powder from one part of the tube to the other, and at the same time concentrating upon it the rays from an arc, the lighter portions of the powder were seen to be blown out as though repelled by the light, and presented an appearance quite similar to that of a comet's tail. The effect was of the same order of magnitude as would be expected from the author's values for light pressure.—*Science*, Jan. 30, 1903, p. 181.

the time they reach the higher and rarified regions of his own atmosphere are practically Roentgen or kathode rays. If very hot metal emits these rays, as we know it does, there is every reason to think that the superheated sun's surface does the same. Those rays which are visible to us lie mostly in the plane of the ecliptic, and give rise to the peculiar evening glow in the west which we speak of as the zodiacal light. This will also explain that similar, but very faint, appearance sometimes seen before the eastern sunrise, which the Germans have significantly termed the "gegenschein."

No one can have watched the aurora without being struck by the similarity of its manifestations to those of the kathode rays in a Crooke's tube, especially when these latter are subjected to a magnetic field when they describe helices about the lines of force. The negative particles coming from the sun are scattered most thickly on the equatorial regions of the earth which are most exposed, but before they reach a level in our atmosphere dense enough to excite luminescences they are caught in the lines of force of the earth's great magnetic field and follow them. As these lines dip outward from the equatorial heights toward the surface, at our magnetic poles, they finally reach an elevation where the rarifaction is comparable with the vacuum of a Crooke's tube, and here they begin to give out the shifting, darting lines of enormous kathode rays. When they reach the denser layers of the air their energy is exhausted, hence the dark circles around the magnectic poles from which they seem to dart. The Swedish North Pole Expedition, by a large number of trigonometrical observations, established that the average distance above the ground of the base of the aurora is, at Spitzbergen, about 34 miles, at which height the pressure of the atmospheric nitrogen is about one-tenth of one millimeter. It has been also shown that at such pressures the rays of nitrogen and oxygen fade, while those of argon and the other light elements, helium, neon, krypton and xenon, take their place. Furthermore, that electrical discharges traverse six or eight times as much space in helium and neon as in hydrogen or argon. This will also explain why the spectra of argon and neon are seen in the aurora much oftener than those of helium, krypton and xenon.*

Additional plausibility is given to this explanation by the relation now universally accepted between sun spots, auroræ and magnetic storms, which have a common variability.

If kathode rays really occur in this way and to this magnificent extent, our aurora being occasionally visible evidence thereof, then the negative ions formed by ionization of the air will form centers for condensation, and falling to the earth will charge it negatively, leaving the air at moderate heights charged positively. If this be true, then clouds should be more common in years when the aurora is more frequent, which is actually the case, since condensation will depend upon the number of ions available for nuclei. The ordinary phenomena of lightning are then to be interpreted as immense sparks taking place across this spark gap.

This theory is capable of further extension to cover the formation of meteorites and nebulæ. By the aggregation of those particles which miss the earth and the planets larger masses are formed, or by the union perhaps of these with similar streams proceeding from other suns. Thus are constructed masses of various size which obey gravitational impulses, or the attraction of other masses, and move in space in accordance with these governing impulses. Yet other particles escape the other suns and stars and help to form the gaseous nebulæ, for it is well known that there are certain nebulæ which are not resolved by any telescope and whose constituents are shown by the spectroscope to be gaseous. These exist in interstellar space at the temperature of absolute zero, at which molecular activity is almost or quite stilled and are not capable of shining by any property of their own. Only their outer borders shine because of their bombardment by these particles which give up their electric charges and cause the gases of the nebulæ to shine like those of a vacuum tube.

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* Air contains by volume, at the earth's surface:

1 per cent argon.
1 or 2 parts neon per 100,000.
1 or 2 parts helium per 1,000,000.
1 or 2 parts krypton per 1,000,000.
1 or 2 parts xenon per 20,000,000.

Such is a very brief résumé of the electro-magnetic theory of light as comprised in the fascinating and ingenious speculation of Arrhenius, as popularly set forth by Cox (Popular Science Monthly, January 19, 1902, p. 265), and may perhaps serve to give a little clearer notion as to the so-called corpuscular nature of both electricity and light.

We are now so accustomed to availing ourselves of that most interesting fact discovered by Roentgen only seven years ago — that the kathode rays of a Crooke's tube not only produce fluorescence of certain salts, but permeate many apparently solid objects while causing others to cast shadows — that we are inclined to forget how recent is this discovery, and how much it has meant to us. We are also likely to forget that Roentgen was but the last one of a group of men who had been studying the phenomena of electrical discharges in vacua. Crooke succeeded in producing higher vacua in sealed tubes than any of his predecessors, and he had reduced the pressure of the residual air in these tubes to about one ten-millionth of an atmosphere. He had shown also that at a certain stage of this exhaustion electric discharges from the kathode became visible, and had assumed that this was a projection of active matter shot off from the negative pole with a velocity which he figured at about 250,000 yards a second. Lenard, in 1894, found that these rays traveled better in a vacuum than in air, that they would pass through substances opaque to ordinary light and affect a photographic plate. It was Roentgen's service to show that when the degree of vacuum was increased a variety of rays was given off which were more powerful than the Lenard rays, which seemed to be unaffected by the magnetic field, and that particularly those salts which are now used in the fluoroscope glowed under their influence.

The nature of the kathode rays is not now quite as mysterious as it was when they were first discovered. To more completely understand them we should refer to the ordinary spectrum thrown upon a screen when light passes through a prism. The more we extend our knowledge of this spectrum the better we appreciate that beyond the red end may be felt the heat waves, which are of longer wave length and which do not pass so easily through glass as does red light; thereby affording the reason for the use of a glass fire screen. Beyond these rays are others of still longer wave length which were carefully studied by Hertz and are often known as the Hertzian rays, which have the peculiar property of converting poor electrical contacts into good ones when they fall upon them. A demonstration of such effect may be made with powdered aluminum which ordinarily is a poor conductor, but which under the influence of Hertzian rays becomes a god one. These rays are supposed to have wave lengths even several miles in length, and they are the longest in this respect of any that have yet been discovered in the spectrum. Proceeding from this ultra-red end toward the other end of the spectrum we find that wave lengths rapidly diminish, and when we come to those known as the ultra-violet they are estimated as only one sixty-thousandth of an inch in length. These ultra-violet rays are also ordinarily invisible, but can be demonstrated by their property of producing fluorescence in certain substances, for instance, uranium glass, which under their influence shines with a greenish yellow light. They also affect the silver salts more speedily than do the visible rays of the spectrum.

Beyond the region of these actinic rays are others, called after Niewenglowski and Becquerel, who discovered them.

The phenomenon of phosphorescence is as yet one of nature's mysteries. It has long been known that calcium sulphide, which is the basis of luminous paint, shines in the dark — but only after it has been exposed to sunlight; by such exposure it has acquired a property it loses after a time.

Niewenglowski was probably the first to establish the fact that from phosphorescent substances certain luminous rays are emitted which may pass through opaque screens and affect sensitive plates. He proved this with calcium sulphide which had been thus exposed to sunlight. It emitted rays which passed through an aluminum plate. But Niewenglowski's rays are due to the action of sunlight upon the material which he used and which later emits them. Without preceding sunlight there would be no rays of this character. And these rays are refracted by glass like ordinary light rays, this apparently showing that they are not made up of a stream of corpuscles as are the kathode rays. These rays were first studied by Becquerel and may be spoken of as Becquerel's rays; i. e., light rays of ordinary wave motion capable of penetrating certain opaque objects.

Becquerel very early conceived the idea of studying whether the property of emitting powerfully penetrating rays was not intimately bound up with phosphorescence. He proceeded empirically by placing various phosphorescent substances enveloped in opaque wrappings upon sensitive plates. In this way he discovered that a mineral containing the metal uranium left its marks upon the plate, and that it was not necessary that this material should be previously exposed to sunlight. By further ingenious experiments it was shown that uranium in metalic form, prepared in the electric furnace, gave out greater abundance of rays than did any of its compounds, and that this emission of rays was continuous and direct, even, so far as could be seen. never ceasing. The next step was to ascertain whether this property was due to uranium itself or to some other substance contained within it. A further study showed that the metal contained certain impurities, and further still that these impurities were composed of at least three distinct elements — radium, actinium and polonium. Uranium is prepared from pitchblende. From this mineral Professor Curie and his wife isolated a very small quantity of radium which they finally got in a nearly pure form of radium chloride, which has been shown to have a ray-emitting power several hundred thousand times greater than uranium. If radium could be secured in pure form, it would have a value of nearly $1,000 a grain. To-day in all the world there is less than a gram of pure radium chloride, and the other elements mentioned are mainly known by their spectra.

Becquerel rays then are these emitted by radium in some of its forms. Radium stands alone, so far as is at present known, in its powers in this direction. If a tube of its chloride be held to the forehead in the dark, with closed eye, the experimenter will still see light, since the retina itself becomes phosphorescent. It shines quite vividly by its own light. When applied in sealed tubes to the outside of the body it produces intense dermatitis, or even sloughing of the skin. It imparts its radio-activity to any substance placed in its neighborhood. Not only metal objects, but the clothing, and even the bodies of exposed experimenters give out rays capable of affecting photographic plates and discharging electroscopes.

It has been lately proposed to employ radium locally over superficial cancers, and to thus take advantage of its wonderful properties in influencing the disease process. But until it can be procured in some reliable or semi-reliable form this will be impossible. A gram, if it could be procured, would be worth at least $10,000 to-day, and there does not exist at present in all the laboratories of the world even so much of this precious substance.

Becquerel further experimented as to the effect of a magnet upon these rays. He has shown that some of them at least are deviable while others are not; that is, they really consist of two distinct kinds of radiation, one influenced, the other uninfluenced by the magnet. The former seem to be identical with the kathode rays of a Crooke's tube, while the latter are identical with those particularly described by Roentgen.

Perhaps the greatest mystery of all is the source of the ceaseless energy which radium emits. The answer will probably be found in those vibrations of ultimate matter which are transmitted throughout space, which, as Duncan has said, is all a-quiver with the waves of radiant energy, ranging from the infinitely short to the incomprehensibly long, the rays which most interest us being exceedingly short, while the waves of great length, corresponding to the sound waves of the organ diapason, are the waves of Hertz and Marconi, equally mysterious, but concerning us less at this time and place.

It is known that certain insects and small animals give off a peculiar radiation which much resembles the Niewenglowski rays, which will pass through aluminium and affect sensitive plates. Finally, still further along in the scale, we come to the kathode rays, for which our only source at present seems to be electrical discharges in high vacua. These rays have a wave length and a velocity which can scarcely be measured. I will not attempt here to state the figures. They are doubtless of the same general character as those manifestations seen high in our atmosphere, which occur at any or all times, but which are more visible at night, to which we give the name of the aurora. There is every reason to think that both are produced alike by a stream of the corpuscles of which I spoke in the early part of this paper, or of that incomprehensibly attenuated matter to which in times past we have vaguely given the name ether, and to which Crooke referred in his description of the fourth or radiant state of matter.

When these discharges occur under our control and production it may be noted that the kathode rays will not only cause fluorescence and affect sensitized plates, but that they also will discharge bodies charged with electricity, their power in this direction being more conspicuous than those of the ultra-violet rays. The reason for this last fact is that the kathode rays destroy for the moment the insulating properties of the air, and that the electricity consequently leaks away from the charged body. Apparently they do not show this effect through solid insulating material, nor even through the skin.

So far as the action of the X-rays upon micro-organisms is concerned, numerous experimenters have reported various results, some of which are quite contradictory. Experiments have been made in various ways, with bouillon and plate cultures manipulated in various ways, and the organisms experimented with have been of all degrees of virulence. Perhaps the most instructive of these were made by Reeder, who exposed culture plates beneath sheets of lead, with openings made in them so arranged that the rays would fall upon distinct portions of the culture further on, even excluding ordinary light by black paper. He found that the various organisms flourished in those parts where they were sheltered from the X-rays by the relatively opaque lead screen, whereas on the exposed areas they were either absent or feebly developed. That the chemical nature of the medium was not altered was shown by the fact that cultures subsequently grew upon these areas. These experiments are certainly suggestive and indicate the probability of inhibition of bacterial growth by X-rays, or else by electrical influences in connection with them, to which influences alike would be exposed those parts of the body which are subjected to the X-ray treatment of to-day.

The general conclusion which Reeder reached is that bacteria outside of the body, in suitable media, can be deprived in this way of capacity for further development.

A number of experimenters have carried these investigations further, and after inoculating animals with various bacteria have exposed them to the X-rays. These results have been practically negative.

Passing now from electricity to light we must study it first by some of its effects. Our knowledge concerning the action of light upon living organism, animal or vegetable, is very inexact. It is known that the rays of the darker end of the spectrum, namely, the most refracted, are those possessing the greatest degree of chemical and the least degree of heat activity. The reason for this is absolutely unknown. Studies on the effect of monochromatic light would seem to indicate that upon animal organisms the chemical rays seem to exercise something of a distinct influence.

That plants are very easily influenced by light has been firmly impressed upon my mind ever since I saw the late George Romanes demonstrate before the British Physiological Society, in 1890, experiments which he had made with fresh and tender young mustard plants. He sowed the seed in suitable small receptacles and when it began to sprout placed them in a dark chamber. In this chamber electric sparks were produced by an induction coil at varying rates. Invariably the plants turned their tops in the direction of the sparks even when these were produced so slowly as once a minute. It was as though every tiny plant were looking toward the source of the light. I have never seen these experiments of Romanes referred to, but it seems to me that they have an importance of their own.

This appears corroborated by this fact: The ultra-violet rays have the property of discharging a negatively electrified body. When such a body be provided with a zinc surface it has been shown that while the rays produced by an arc light required 12 seconds to discharge an electroscope the condenser spark would do the same thing in 5 seconds. Evidently then condenser sparks are very rich in ultra-violet rays. (Turner, Medical Electricity, p. 365.)

The effect of ordinary light upon bacteria has been studied by many observers, who generally agree upon the conclusion that light is of itself the best, cheapest and most generally available of bactericidal agents. Experiments with monochromatic light have shown individual differences, and it would appear that the heat rays are much less effective than the chemical rays. Gruber has shown that the violet rays have a much more pronounced effect upon ordinary earthworms than do the red rays, and that this effect is perceptible even upon decapitated worms. Dubois has made similar experiments with proteus, which is the most active in the darkness of the red rays and least so under the influence of the chemical. Fifty years ago the Vienna physiologist, Bruecke, demonstrated the color scale through which the chameleon would pass on changing from darkness to light, which changes are due to the pigment cells in the skin, and which he showed to be thus capable of migrating from the depths to the surface and *vice versa*. Paul Bert carried the experiment further and exposed one-half of the chameleon's body to red light and the other part to blue; under the former the skin remained light, under the latter it changed to dark. Numerous other experiments made upon animals would indicate the role played by light in their pigmentation.

So far as the human skin is concerned, it is, of course, possible to very seriously affect it by heat rays, but it would appear that under ordinary circumstances it is the ultra-violet or chemical rays which produce both pigmentation and erythema, the latter often extending into a dermatitis.

The same effects are produced by sunlight in the polar regions as in the tropics. It was Charcot, who, in 1859, first stated that the chemical and not the heat rays of electric lights produced skin affections identical with those produced by sunlight.

It would appear, furthermore, that the pigment in the skin serves as a protection against the chemical rays, which fact was perhaps first stated by Unna in 1885. In general, we know that as we approach the equator we find mankind darker in color, and that the most gorgeous plumages are found in tropical regions. Moreover, the most exposed parts of the body seem to be thus most protected by pigment. The back is usually darker than the belly, and this is conspicuously so in the case of creeping animals and flat fish. Sunlight seems to have the same effect also upon vegetation, the degree of coloration depending not upon the intensity of the light, but upon the number of chemical rays.

The irritative action of the actinic rays upon the skin may produce all sorts of lesions, from the mildest hue to a gangrenous destruction, depending not alone on the intensity of the light, but the proportion of its chemical rays. These lesions are naturally more pronounced upon persons of light complexion or blondes, while albinos suffer most. Observers have studied the effect of electric light upon the skin and eyes. Maklakow in order to protect others studied the effect upon himself and suffered severely, both in his eyes and upon the skin of the face, the pain and œdema of the face and conjunctiva being almost unendurable. Widmark, examining the subject for himself, found that when the ultra-violet rays were excluded the skin was uninjured, when the heat rays were excluded there was no particular difference.

In this connection there enters another factor, apparently unappreciated until Finsen and his pupils took it up. It relates in fact to this, that only such amount of light as is actually absorbed by the tissues is of injury to them. In other words, the actinic effect of light is directly proportionate to the degree of its absorption. When now we test tissues to see which has the greatest capacity of absorption we find that in reality the blood excels in this respect. This is a matter to be again alluded to, but it affords the explanation for the practical demonstration of the fact that the parts to be exposed to the Finsen light are to be made as bloodless as possible. Exposure to light is again the explanation for not a few of the pigmentary and other lesions of the skin, e. g., pellagra and xeroderma pigmentosum or melanosis lenticularis. The first appearances are met with upon those parts most exposed to light.

Again, the influence of light upon the course of variola seems to have been recognized for a good many years. It was first mentioned in 1832 by Picton and in 1867 and later by Black, Barlow and Waters. One will readily recall that the deepest and most numerous scars occur upon the face and hands. Finsen and numerous other observers have noticed that by keeping smallpox patients in rooms with red glass windows, similar to the dark rooms of the photographer, i. e., that by thus filtering out the ultra-violet rays, there was very much less tendency to marking on the skin. Finsen also calls attention to the fact that it is possible to more or less protect the skin from the infection of the chemical rays by painting it with tincture of iodine, or with solution of copper sulphate, or with some ointment. The iodine colors the skin yellow; the copper solution absorbs the actinic rays and tends to color the skin black, whereby all rays are kept out.

In this connection it is worth while to remember the fact alluded to by Petersen, that in the middle ages it was customary to treat smallpox with a red colored environment, since red bedding was used, red balls were placed inside the bed, etc. Exactly what the results were we do not know. In Roumania there used to be an ancient custom to cover the face and hands of smallpox patients with red cloth, and a French naval surgeon wrote some time ago that he had often seen in Tonkin these patients shut up in alcoves which were completely closed with red hangings.

At all events it would appear that the exclusion of chemical rays should be *absolute;* that it should be continuous until the vesicles are completely dried up; that even a short exposure to light materially damages the result; that the treatment should be begun very early; that it in no wise interferes with any other treatment, and that by resorting to it suppuration and disfiguration can be remarkably diminished in degree and extent if not absolutely prevented.

Finsen has also carried out a number of interesting observations upon the irritating properties of chemical rays. For instance, very young salamanders lying at the bottom of a dish of water are not disturbed by red or yellow light, but by blue they were promptly excited to movement; so it was too, as before remarked, with the ordinary earthworms, which would collect beneath the red and avoid the blue glass. Gruber had also the same results, from which it would appear that various animals can distinguish by their integuments between red and blue; while they seem to enjoy the former, they avoid the latter tint. He found this true to such an extent that he described a specific photo-dermatic sense. The same thing may be seen even with common house flies. Indeed the effect may be so pronounced as in certain cases to produce reflex motions in embryos and lively reaction in various smaller animals. It thus would appear that light is awakening in more than one sense.

Nearly all investigators having agreed that light is a powerful bactericidal agent, it is not strange that certain infectious diseases of the surface of the body, when exposed to it, have been found to yield to the treatment. In fact, at present it seems to be a question merely of the depth to which its effects may be made to be felt. There is no better illustration of a lesion of this kind than ordinary lupus. There is no question but what sunlight would be always the most serviceable for this or similar purposes were it always available. When it can be used a very simple chambered plano-convex lens can be used for the purpose. It should be several inches in diameter, with chamber open at the top in order to permit it to be filled with a methyl blue or blue vitriol solution, by which the heat rays are filtered out. This only needs to be mounted as is a compass in order to permit of its use whenever the sun is shining brightly.

I have already remarked upon the light absorbing powers of the blood. A very simple experiment may be tried at any time which will show the necessity for rendering the parts exposed to phototherapy as bloodless as possible. A piece of sensitive albumen film may be placed behind the ear in contact with the cartilage. If now the ear be exposed to ultra-violet rays, even for several minutes, without compression, the effect upon the film is relatively small, but if the cartilage and the paper be pressed together between glass plates, so that the blood is expelled from the living tissue, the paper will be promptly blackened in less than 20 seconds' exposure. This is an experiment so convincing that it justifies all the efforts made to render parts anemic. Hence the various compressors and pieces of apparatus which are used for this purpose. Only inasmuch as it is known that ordinary glass itself filters out a large proportion of ultra-violet rays, it becomes necessary in order to obtain the best effects to use compressors made either of ice, rock salt or quartz, since these easily permit the ultra-violet rays to pass through them. The instruments used now should all be provided with quartz plates and adapted to this purpose; hence the expense attached to such apparatus. It is desirable also that the patient be so exposed that the light shall fall perpendicularly upon the affected surface. Working thus with rock crystal and with an electric lamp of 80 amperes Finsen claims to have destroyed the micrococcus prodigiosus in one minute, and to have practically disposed of lupus nodules, so that they would shrink up and disappear after 15 minutes' exposure.

This matter of the total exclusion of glass and substitution of quartz or rock salt is more important than has been generally appreciated. The violet rays easily pass through glass but the ultra-violet rays are almost completely excluded by it. Again the difference between the effects produced by the ultra-red and ultra-violet rays should be emphasized. The former, the heat rays, produce more or less redness of the skin which quickly disappears. On the other hand, the actinic rays produce scarcely any reddening, while their maximum effect is not attained for from 12 to 24 hours.

Practically we have to produce the ultra-violet rays either by using sunlight, which limits the production, or by one of two artificial means: the utilization of the arc light or by electric sparks from a condenser. There will always be a certain disadvantage attaching to sunlight, namely, the amount of heat radiation, which must always be prevented by some filtering arrangement, and while copper sulphate solution, e. g., will answer this purpose, it also takes out some of the other rays which one does not want to lose.

If an arc light could be provided with iron electrodes a much larger number of ultra-violet rays would be given off than are produced by carbon, but then the arc light so made would be a source of a large amount of radiant heat. Electric sparks are known to give off light of high actinic value, and so-called condenser spark lamps have been devised, and are now on the market, by which a discharge is made to pass between two electrodes, which preferably are of iron. Such lamps are useless, however, unless they are provided with quartz fronts or lenses.

The salts which ordinarily fluoresce are not so sensitive to the ultra-violet rays as to the Roentgen rays, and the fluoroscope cannot be used with the Finsen light.

The ultra-violet rays have this most peculiar property, that they can discharge a negatively electrified body, in which respect, of course, they differ from the condenser sparks, which will discharge any charged body, from which it is evident that the condenser sparks is very much richer in these rays than the arc light. They can also produce nuclei for cloud condensation in moist air, and finally, in addition to this, they have a special action on the skin, at least of the higher animals, and on the entire tissues of the lower animals and plants which has been already noted.

When tested carefully as to its transparency to the ultra-violet rays a sheet of glass one twenty-fifth of an inch thick proves to be as opaque as a piece of hard rubber one-fourth of an inch thick or as the entire hand. The most transparent material is polished pure rock salt which must, however, be kept both clean and dry in order that it may preserve its properties.* A condenser spark

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* At the meeting of the American Physical Society in Dec., 1902, Prof. R. W. Wood described and exhibited a screen which was transparent to ultra-violet light, while being opaque to the rest of the spectrum. Such a screen is very useful in photographing ultra-violet spectra, since it enables the overlapping spectra of other orders to be eliminated. The author showed an interesting lecture experiment in which the rays of the lantern, after passing through such a screen, were concentrated to an invisible focus, where a suitable fluorescent substance was excited. The screen was made by combining a gelatine film containing nitroso-dimethyl-aniline with copper oxide and cobalt glass.—*Science*, Jan. 30, 1903, p. 182.

Summary.

We thus have two therapeutic agencies affording u
treatment which are so new and to such an extent s
that we must hesitate lest enthusiasm run away wi
in discussing their merits and their applicability.

Nevertheless the results of extensive experience ma
formulated in the following safe and warranted concl

1. They afford methods of treatment for extremely
of limited area and superficial character, which, while
certain, are extremely promising.

2. They not only cause no pain but tend to reliev
superficial and deep, in a most pleasing and satisfacto

3. They are adapted to cases which can hardly be s
any other method of treatment, and they afford more
layed or inoperable cases than does any other method o

4. It will be found that the odor of putrefaction m
suppressed by their use and the putrefactic process its

5. Burns and intense dermatitis, so frequently note
treatment first came into vogue, may now be almo
avoided.

6. More than this, they afford a supplementary meth
ment after operation, by which the benefits of the sa

pain is deep-seated and of uncertain origin. Even such use of the X-rays as is called for in an ordinary fluoroscopic examination, has been known to relieve pain, although by it nothing else was accomplished.

What it may accomplish in deep cases is as yet pure conjecture. Without entering into detailed reports I am at least positive of this, that in certain inoperable cases of intra-peritoneal cancer and tuberculosis, accompanied by more or less ascites, kathode rays have certainly relieved pain, retarded extension of the disease and apparently been of great benefit, even if such benefit prove but temporary. This of itself is of greatest value, and can be accomplished better in this way, perhaps after an abdominal section, than by any other measure with which I am acquainted.

The X-rays apparently will also relieve itching in certain instances, and may especially be used for removal of hair, for cosmetic reasons or in treatment of sycosis, of favus, of psoriasis, and will be found serviceable in the removal of those birthmarks which are covered with, or surrounded by, considerable growth of hair. So far as photo-therapy is concerned, it must necessarily find its widest range of application when the disease is limited to a small area and is superficial. Morris and Dore have shown (British Medical Journal, February 9, 1901, p. 326) that there are certain skin conditions which are not favorable for phototherapy, especially such scarring as results from previous scraping, pigmentation by which the ultra-violet rays are intercepted, vascularity in those parts where a compressor of some kind cannot be applied, deep lesions, and those of skin or mucous membrane whose location makes it difficult of treatment, e. g., about the eye, in the nose, mouth, etc.

February 1, 1903.

An Epitome of the History of Carcinoma.

By Roswell Park, M. D., LL. D.

No one can scan the voluminous literature of cancer without being at first bewildered by the confusion of names and the loose and almost meaningless way in which the term and its various synonyms have been used. It is bad enough even to-day when one writer describes a growth as cylindroma and another writer rejects the term. If this be bad to-day when we have reasonably accurate notions of what constitutes cancer, how much worse must it have been centuries ago when a hundred different conditions were described under the same general term. It does not seem worth while to go back to the beginning of the Christian era since the writers who followed Hippocrates simply represented his views, and we do not need to trace them into antiquity. Let us then begin with Celsus, who wrote "carcinoma" in its Latin spelling and did not use the Greek "karkinoma," although many of his translators have done so.

In his day, and long after, ulcers of all kinds were confused with tumors of all kinds, which will account for his making particular mention of venous stasis and swelling veins, and noting the fact that sometimes carcinoma causes pain and breaks down into an ulcer and at other times not. He took this view—that if the actual cautery produces no bad effect the disease is curable, whereas if the growth is stimulated by the cautery it is a carcinoma and active therapeutics must be discontinued. It is a curious fact that the theory of the development of cancer given by Celsus should be made the basis of an essay by Schmalz in 1825 (*Surgical Treatment and Surgical Diagnosis*).

The early writer and his late imitator distinguish some sixty or more different kinds of ulcers, among them those due to a peculiar diathesis, *i. e.*, cancerous, and so he described ulcus cancrosum, cancer apertus, cancer genuinus, noli me tangere, open cancer, glandular cancer, etc. Celsus used frequently the term cacoethes in the substantive sense, whereas Schmalz uses it as an adjective, *i. e.*, cancer-like. In his clinical descriptions Celsus was painstaking and often accurate. In fact he used adjectives very freely. Chironium and telephium were terms applied to an ulcer accompanied by severe pain, induration and general formidable appearance with tendency to spread. Such terms might apply equally well to a malignant ulcer or a chancroidal bubo.

According to the Celsian view, should the suspected ulcer not improve under appropriate treatment it is certainly a cancer, but no one could make the decision without time and experiment. Writing of this, Thiersch quoted the *bon mot* of Duparque to the effect that "Cancer is incurable because it cannot be cured; the reason we cannot cure it is because it is incurable; therefore if one by chance should happen to cure it, it must be that there was no cancer." They had in those days also what was called *thymium*, a lesion of doubtful character, about which there was much uncertainty. Celsus remarks that "it is like a wart, and therefore in some respects must be different, but occasionally is found on the surface of an ulcerating cancer. Nevertheless it has an independent growth of its own."

This would look like the so-called "proud flesh" of the laity as the expression, "then comes the ulcer and from it the thymium," would imply. This word, by the way, is spelled also tymium and timium. The expression seemed to the writers who used it very apt, although the younger Pliny used it in the sense of a simple swelling, and applied it indiscriminately to a boil, a pile, or a condyloma. The thymium was not very different from what was called *akrochordon*, which was described as species of wart, sometimes very painful, ovoid in shape, connected to the skin by a slender stem and known as the "hanging wart." It was so-called because the cutaneous surface resembled the cut end (*ἄκρα*) of a harp string (*Χορςή*). According to some descriptions the former would appear to be a simple horny outgrowth from the skin, and the latter a fungous papilloma; according to others, who use the expression *pessimae*, we are compelled to regard them as something more serious. In addition to the terms now strange to us, above mentioned, Celsus also used the words *murmakia* and *clavus*, which latter is still in use. Clavus in his day seems to have signified a pus-producing swelling.

Celsus seems to have been conversant with the step by step process of infection, both malignant and pyogenic, but I think that we waste time in trying to determine more minutely just what he in his day meant by these terms which I have thus far rehearsed. So late as 1777 Blanchardus contented himself with presenting this subject practically in the language of Celsus, adding nothing thereto, and having in his preface scarcely a word to say for himself on the subject; but the more one examines Blanchardus the more evident it is that he was destitute of enterprise in medical research. There is no question that Celsus lived at a time when men had no use for the exact sciences, as even the elder Pliny acknowledged. The world was given over to excess and debauchery, and the worst form of imperialism controlled Roman thought. Medical literature of that date consisted mainly of formulæ for cosmetics, and while the baths were conducive to health and to cultivation of artistic taste, they were destructive to public morality. Some effect was produced by the alarm voiced by Plutarch and Tacitus, by the merciless satires of Juvenal and Perseus, and by the well directed philosophy of Seneca.

In the year 131 Galen was born at Pergamos, and he finally appeared in Rome as the private surgeon and medical adviser of the young Commodus. He curiously mingled philosophy and medicine, and combined with the humoral pathology of Hippocrates a pneumodynamic theory mainly his own. To him the malignant character of cancer was well known, and he added to the views of his day concerning its internal manifestations. "In the breasts we often find a tumor in size and shape closely resembling the animal known as the crab, for as in the latter the limbs protrude from either side, so in the tumor the swollen veins radiate from its edges and give a perfect picture of the crab." Here will be seen perhaps the first publicly stated reason for giving to this disease this particular name. He also busied himself with its treatment, and while he considered cancer to be the product of black bile, was not opposed to operation but gave this advice: first to get rid of the black bile by appropriate remedies and then to attempt a cure by milder applications since "the more severe remedies merely increase the evil." He told us that there are many metallic compounds which, taken with purgatives, have a beneficial effect upon the disease in its early stages, concluding that if one is "minded to try the cure of cancer by surgery he must as before begin by purging the evil humor, and then immediately proceed to the removal of the diseased part so thoroughly that there shall be nothing of it left, by letting the blood flow freely and being in no haste to check it, but rather squeezing out the thick black blood from the swollen veins." Galen thus showed that he recognized that cancer possessed a malignancy peculiarly its own, for which reason he advocated the combination of medicine and surgery.

Galen operated for cancer with the knife and cauterized the wounds, not alone for hemostatic purposes but for the destruction of any remaining diseased tissue. He noticed that successful results occurred when the operation was carried out, and his language as well as his actions show that he was familiar with true carcinoma, although he was not aware of the function of the lymphatics. He nevertheless was earnest in calling attention to what he knew of metastasis, even through the venous circulation. Evidently with him also it was not only the amount of the humor but its character which determines the subsequent growth, but he says it is the thinnest of these humors which give rise to the herpetic ulcer while the thicker causes cancer. Galen's general pathology was a sort of organic theory of disease. He maintained, in opposition to Archigenes, that it is always by reason of disordered function that a part becomes diseased, and that an organ can only become directly diseased as a result of transmission from other diseased foci. Hence we can readily understand his object in always preceding an operation for cancer by a system of general treatment. If therefore he became enthusiastic in his praise of phlebotomy, or his use of purgatives, we must give him credit at least for some sort of rational basis for his therapeutics.

Following the death of Galen medicine entered upon a period of quiescence if not somnolence. Leonidas of Alexandria, some 200 years after Christ, wrote as follows, if we may trust Aëtius: "If therefore the breast be entirely involved in the scirrhotic growth so that the surrounding part is endangered should an amputation be attempted, under no circumstances should we operate. If, however, the apex or only one-half of the breast be included in the growth, the breast should be removed and the wound cauterized." When he feared hemorrhage he often operated in two sessions, for he says: "I then cut a second time and dissect out the whole breast and afterwards cauterize the wound, often repeating the cautery." The first cautery was for hemostasis, the second for the extirpation of infected tissue.

For several centuries nothing of interest transpired until we come to the writings of Alexander of Tralles, who excelled rather in treatment than in diagnosis. In his ninth book he discusses cancer and offers several methods of treating it from a humoral point of view. Among other things he highly praises the treatment of cancer of the liver by the use of chalybeate waters.

The work of Paul of Ægina is mainly a compilation, in the fourth book of which he treats of external diseases, among them cancerous tumors, for the treatment of which he repeats Galen's precepts; particularly the advice that all operations are to be preceded by free purgation of the black bile. After Paul there came little of any value. Nonus and Mercurius in the tenth century were absolute compilers, and Myrepsos, another of the same class, was dubbed by his contemporaries "the perfumer," polypharmacy being his strong point. His book on medicine is an alphabetic breviary, divided into 48 chapters, containing some 300 senseless prescriptions with pathetic appeals to God and Christ. His treatment of cancer is included under the head of "aromatics and specific for the cure of lice and spots on the skin."

The Arabs were too firmly bound by the authority of Galen to make any advance. They added still more to the polypharmacy of their day, and not until the time of their later scholars was ything of value said regarding cancer. Avenzoar, however, ho was really of Hebrew origin, showed a rather remarkable owledge of pathology, as is illustrated in his discussion of ncer of the stomach. Some of their writers advised early extir- ation of cancer and of all infected tissue. Albukasim remarks, When cancer has become old and large you should have nothing do with it. I have never been able to cure one, nor have I ever en anyone who has."

The notions of the Arabians were reflected in the Latin writings the middle ages. William of Salicet says "Cancer is a tedious sease—the more you interfere with it the worse it becomes." e frequently termed it *noli me tangere*. Lanfranchi says: "The eneral rule with cancer is that it can only be cured when it can entirely removed, along with its roots." He had noticed the currence of cancer in badly healed wounds and advised their rtial cauterization—for the purpose of diagnosis. If the growth creased it was an original cancer. Guy de Chauliac endeavored recognize the cause of cancer; his conclusion was: "Ulcerating ncer is caused by the existence of a former non-ulcerating can- r, or the irritation of chronic ulcers." He also held that if it in a locality where it can be entirely removed it should be perated; if not, no attempt should be made save at palliation. e advised caustics for causing the death of suspicious tissue, nd considered arsenious acid as desirable for this purpose. If e diseased tissue was thus completely destroyed the fact was own later by the advent of a scar and healthy appearance of e adjoining flesh.

But in time all operations fell into disrepute and cancer came be regarded as practically incurable. The theorists of the iddle ages, with their immutable dogmas and superstitious verence for Galen, obstructed progress in every direction. ncer was as before, "an ulcer of horrid appearance, evil smell- g, and presenting a hard, thick, discharging, everted border."

It was centuries before men could break away from the use of e red-hot knife. The celebrated Fabricius, he of Aquapendente, vised that glands be seized by forceps and cut away with a red- t knife, or that an incision be made about the breast with a wooden or horn knife previously dipped in aqua fortis, and the glandular substance subsequently removed by the means of the finger and nails. But let us give the credit due to Fabricius for the suggestion to feed by a tube introduced through the nose into the stomach in cases of œsophageal contraction.

Paré, great man as he was, did not make the advance in this direction which might have been expected of him. He did not even do as well as did Fabricius Hildamus, who achieved the title of a noted operator because he operated with the knife, ligated the vessels, and dissected with his fingers. He also cleaned out the axilla in breast cases and conducted many cases to recovery. Paré was in most respects a follower of Galen. Dyscrasis was the ghost that haunted medical literature for centuries, and is not even yet quite forgotten. "Cancer is from black bile," said Galen. "Cancer is the product of melancholie," falls like an echo from the lips of Paré, who described under the head of melanchol tumors true scirrhus and other cancerous tumors correspondi to the cacœthes of Galen.

Paré distinguished four kinds of tumor due to black bile:

1. The hard schirrus proper, which is accompanied by no pa is not sensitive on pressure, and is caused by natural black bile

2. The imperfect, rough, painless, stone-like schirrus, which caused by great chilling or disintegration of humors.

3. The cancerous schirrus caused by heating and corrupting the humors.

4. The schirrus phlegmonides, which is caused by the mixin the bile and the blood.

Paré's treatment for these various conditions included al nence in all respects, the classic method of black bile purga and the external use of counterritants, fumigations, merc plasters, goat dung, and many other more savory applicati beyond which ingenuity could scarcely go. Paré described transition of cancer occultus into cancer apertus, i. e., non-ulc ing into ulcerating forms as clearly as any clinician could de The pain, irregularity of shape, tendency to hemorrhage, oo discharge, infiltration, etc., he faithfully portrayed. On on pages he gave a picture of a large sea crab, and says: "Also cancer is brownish-blue in color, and uncouth in shape, like animal whose picture is appended." He realized that women more subject to cancer than men, called attention to the fre- ency of infiltration and metastasis, did not decry operation, but minded his readers of the thirty-eighth aphorism of Hippo- ates, which counsels against operating upon deep-seated, occult cers or those of long standing, or those occurring in patients feeble constitution. He advised the use of sweet milk to de- oy the odor of cancerous discharge.

His operative methods comprised two distinct procedures: the cision of the tumor with a broad margin of healthy tissue, with mpression of the neighboring vessels and vigorous use of the t iron, or the elevation of the tumor by means of a thread passed rough it, its extirpation by means of scissors, with lateral in- sions when necessary for relief of tension.

Throughout the seventeenth century black bile continued to be garded as the chief cause of cancer. Frere Côme set a good ex- mple to posterity when after having purchased a secret nostrum made public its ingredients, which were about as follows:

Cinnabar	2 parts
Ashes of old burnt shoes	3 parts
Dragon's blood and white arsenic, each	12 parts

This was applied in dry powder or in paste mixed with oil.

One of the earliest real departures made from the old tenets s that of Le Dran, who in 1757 published a work in which he owed the purely local character of cancer in its beginning and n formulated the best methods of cauterization. He devoted nsiderable space to the discussion of tumors of the breast of ich many are curable, and expressed the opinion " that not all cancer which has been taken for such." Soon after this came uis's publication on fungous growths of the dura and diseases the eyeball, including cancer of the eye. Still confusion of ms complicated everything, and in Plenk's essay on skin dis- ses, published in 1776, he described 18 sorts of tumors, includ- g inflammatory tumors, pus tumors, gangrenous tumors, hard mors, water tumors, blood tumors, etc. This reminds me very much of the hospital that I visited in Seville a few years ago, where one ward was reserved for "Dolores," all patients who were suffering pain being sent there.

Richter describes two classes of tumors: Inflammatory and non-inflammatory, placing cancer among the latter. His remarks are quite in accord with those of van Swieten, who describes them as bad smelling, easily bleeding, rodent, ulcerating growths, which are found on the lips, tongue and genitals. Schirrus they described as a hard, painful tumor situated in an organ rich in glands and having a tendency to cancerous growths, and then admit that these growths may arise from cracks, excoriations, styes, etc. Even Richter could not get away from the old black bile, but he held that it could not arise from inflammation alone. He regarded dyscrasiæ as predisposing elements in causation of cancer. Together with his colleague Schmucker, he denounced bitterly the use of corsets as the invention of "that accursed Pampadour."

While Hunter's contemporaries were playing with belladonna and rabbit skins and all sorts of quackery, Hunter himself was experimenting with the control of fixed tumors by means of compression, but by fixed tumors he meant inflammatory lesions whose nourishment he was trying to reduce by pressure. Fischer and Desault were trying to accomplish the same thing in the case of rectal cancer by the use of rectal bougies. The writings of Munro threw operative treatment into such disrepute that the Amsterdam Guild of Physicians felt called upon to offer a prize of 100 ducats for a safe and practical method of curing cancer. As may be imagined, numerous remedies were proposed, and now came into repute the wonderful properties of cicuta (water hemlock or cowbane) which ran about the same course in those days that cundurango did in ours. As the result of disappointment with all these remedies, operative methods came back into vogue. Cancer of the breast, lip and scrotum were generally operated upon. Finally Petit gave formal expression to insistence upon the necessity for the removal of swollen glands of the axilla in cases of cancer of the breast.

And next came the French Revolution, which not only shook the nation to its very foundations, but was a new era in that the authority of the ancients was no longer revered. A cold materialism sought to derive everything from the inherent properties of matter. Mysteries were no longer tolerated. The doctors of Paris even went down to the halls of death and sought to find the seat and secret of life among the still bleeding heads of those who had been guillotined. It was in 1773 that Peyrilhe declared that to cure cancer, even to define it, was extremely difficult, which bit of wisdom won for him the Dijon prize. Morgagni died in 1771; just thirty years later Bichat gave the final touches to his great work on anatomy. During the winter of 1801 he himself made 600 autopsies in the Hôtel Dieu. Of his work Corvisart wrote to Napoleon that no one in so short a time had done so many things and done them so well. He was the first to distinguish between stroma and parenchyma in tumor tissues, although he ascribed a fallacious importance to connective tissue.

Bichat's spirit survived, although he died a most untimely death, for Laennec made a sharp distinction between carcinoma together with tubercle, and melanotic and other growths, basing this upon their histological structure. Some of the writers of that day saw about these cases that which they regarded as infection, and endeavored to trace its path in the blood vessels and thoracic duct. In the same way we owe to Laennec our insight into the relation of cancer to the internal organs. He also pointed out that schirrus is not merely a hard tumor and a forerunner of cancer, but of itself a distinct form of connective tissue cancer, which he classed along with the encephaloid, melanoma and tubercle being placed among heterologous growths.

It was perhaps Lobstein who first divided tumors into the homologous and heterologous or heteroplastic. He held that those of the latter form arise from some form of lymph that has been introduced into an organ from an outside source. This lymph was compared by Lobstein to Hunter's wound and infiltration lymph, agrees entirely with the blastema and exudate of Rokitansky and even later authors, and is either benign or malign, the latter giving rise to cancer. By the efforts of the school to which Lobstein belonged, including such men as Andral and Cruveilhier, Billard and Velpeau, the differential diagnosis of tumors of the breast was greatly advanced, while such men as

Astley Cooper in England and Walther in Germany were quite won over to these views.

After this the French rather retired from their advanced position, and their place came to be occupied more by German investigators. Stieglitz, writing in 1840, made this sad confession concerning his German colleagues: "German medicine is so far degraded and spiritless that any stimulus whatsoever that pushes it forward in a new road is sure to be of benefit, even though the path be beset with errors and perversities." Soon after this, however, all Germany began to move forward and scores of names are inscribed in imperishable characters in its history of medicine for the past half century. The theory of cancer profited by this forward motion and soon appeared in new dress. In the beginning of the third decade microscopical diagnosis was still a *pium desiderium*. Johannes Müller, after years of work, described six kinds of operable tumors and seven kinds of carcinoma, which could not be cured by extirpation. Our knowledge was materially advanced by the researches of Schleiden and Schwann into animal and vegetable cells, by which many other things were to be reconciled. The allusions of Müller, in his third edition (1838), to the more delicate structures of pathological growths called forth numerous contributions of a similar character from other writers. Moreover, he held that cancer formations do not arise from primitive tissue by degeneration but are produced by new cell formation, deposited as a specific element of disease in the normal connective tissue of the organ. He found also in this statement an explanation for the general infection certain later to pervade the whole system. Translated into the thought of to-day, the most advanced of us would scarcely go beyond a similar doctrine. Müller is believed to have been the first to demonstrate the presence of nucleated epithelium in cancer. Naturally, with such views, Müller discarded all distinction between homologous and heterologous growths. This was taken up by Henle in 1839 and by Vogel in 1842, and an effort was made to prove that each growth is really a variation from normal growth due to defective or to active individual mother cells. About this time also began the attempt to discover specific cancer cells, with the microscope, hose significance would be of greatest importance in diagnosis. his effort was carried altogether too far, since some enthusiasts enied the accuracy of all diagnoses where such cells were not ound.

In 1847 great mischief was wrought by the introduction of the erm cancroid by Bennet. This was to be the term by which all rowths were to be known where the specific cancer cell could not e found. Then Virchow and Förster, as well as Lebert in 1850, mited the term chancroid to diseased tissue which presented lveoli with epithelial collections. Therewith epithelial cancer ecame the cancer par excellence, and many tumors took the name f sarcoma which hitherto were considered carcinoma. In 1852 Ianover introduced the term epithelioma, and Robin and Bidder escribed cylinder epithelium cancer. By this time confusion in erminology was almost complete, and now for several years the pithelial cell, in epithelial cancer, was regarded as arising indeendently of pre-existing epithelium from connective tissue coruscles. It was apparently von Bruns who in 1847 first emphaized the role of the lymphatics in spreading this disease. Even n 1856 the condition was still regarded as uncertain and was the ause of many controversies.

J. Müller had already reported upon the spores given off by the ody humors in cases of carcinoma, and it had been frequently oticed that in cases of melanotic cancer these were heavily harged with pigment. It was not long now before pathologists vere divided as between those who held that primary cancer beomes constitutional by a general infection through the blood essels, by means of a blastema or virus of some sort (theory of nfection) and those who regarded the constitutional effects as lue to the transmission of epithelial constituents and debris theory of transplantation). Others yet saw in primary carcioma only a local expression of a general carcinosis already cquired. The rest of the history of cancer is certainly well nown, and it is scarcely necessary to attempt to bring it down eyond the pioneer experiments of Waldeyer and Volkmann's arly researches. It was through these studies that some sort of rder was finally restored, and that ideas which presented an ndescribable jumble were more or less simplified.

Spectroscopic Analysis of Thirty-six Varieties of Continental and American Orthochromatic Dry Plates.

By F. S. Low, Assistant in Photo-Chemistry.

The multiplicity of uses to which orthochromatic plates are put has of late years so increased the number of brands on the market that scarcely a dry-plate maker exists who does not offer one or more varieties of this product to the purchasing public. From this greatly increased demand and production certain improvements and a greatly increased variety of plates have resulted, and there are at least some makers whose products present a high degree of uniformity. The greatest advance has been in the keeping quality of the plates. Every operator who has employed color sensitive plates under exact conditions, such as in microphotography and three-color reproduction, has, however, learned, in most cases to his sorrow, that the plates have seldom fulfilled the claims of the makers.

The claims made for plates are usually of a very general character, ranging from the statement that they are "highly orthochromatic" to specific data in the case of a very few. The disadvantages of this state of affairs are naturally great. In the photographic work of this Laboratory, which includes more or less all the photographic processes, we have found it absolutely necessary to analyze the different brands in use. As a result we have been able to select plates best adapted to the subject in hand. For this purpose we use a simple diffraction spectroscope fitted with a replica of a Rowland grating. These replicas can now be had at a small cost, and every dry-plate manufacturer, as well as every scientific photographer, can afford to possess such an instrument. With such a spectroscope the testing of the plates is a simple matter. The spectrum obtained by the grating is projected upon the plate by a photographic objective, and the dark slide is so arranged as to permit a series of exposures on one plate. The time of these exposures, the illumination (sunlight at a certain elevation) and the length of development with a standard developer being determined, it is possible to chart the distribution of the sensibility of the plate.

As, on the whole, more reputedly good orthochromatic plates are to be had on the continent, especially from German and French makers, we purchased in the open market two packages from each maker and tested plates from each package. With the continental plates we have also tested the leading American brands. There remain yet certain English brands which deserve attention, and these we hope, for the sake of completeness to add to those here published. As the results obtained are not only of interest but have proven of great use to us, we have decided to publish the thirty-six varieties so far tested. All exposures have been made with a wedge-shaped slit which enables us to construct a curve representing the relative sensibility of the plates. In the diagrams the relative speeds of the various plates are represented by vertical values in the curves, while their color sensitiveness is represented in horizontal values. Sunlight has been employed as the normal standard, the different Fraunhofer lines enabling us to determine with ease the distribution. In each case we give an underexposed and a normally exposed spectrum. It will be seen that the distribution and in many cases the sensibility of the plate in underexposed negatives shows great defects. For instance, in brands Nos. 5, 11, 15, 25, 26, 27, 28, 29, 32 and 34 there is a distinct break in the continuity of the spectra, usually in the neighborhood of the E line. In many of these brands this defect is more or less repaired in the fully exposed plates. In using these plates it is therefore imperative that the negatives be fully exposed. In underexposed negatives from these varieties strengthening will not repair but increase the defect, as the plate in the region of the E line has not been affected by the light in question.

The relation between the yellow-green sensibility and the blue sensibility is in orthochromatic photography very important. Many of the plates show extreme blue sensibility and very low yellow-green. The poorest showings in this regard are Nos. 4, 5, 8, 9, 17 and 24. These varieties would require a very dense yellow or orange screen, and when properly corrected would prove very slow. A number of varieties will be found in which the yellow-green sensibility is equal or nearly equal to the blue. A yellow screen to reduce the blue would render these plates orthocromatic.

It is perhaps well to recall the order of relative luminosity which the colors of the spectrum present to the human eye. The most brilliant are orange, yellow and green, the least red and blue. The relative brilliance of the colors is shown by the accompanying curve (Fig. 1). The plate which most nearly represents this curve and which has a much greater yellow sensibility is No. 29. This plate can, as the manufacturers claim, be used with success without a correcting screen. A very pale yellow screen would render the curve more exact. A number of other varieties will be found in which a comparatively pale screen will accomplish the same purpose. The varieties which show red sensibility are 15 and 28, while No. 29 shows marked orange sensibility. In No. 15 the blue sensibility is greater than the red and yellow, while a wide area of relative insensibility extends over the green. No. 28, on the other hand, shows a practically continuous spectrum with a slight depression between the red, orange and green, and between the green and blue. Both of these plates can be used for three-color photography, No. 28 for all three exposures, and No. 15 for the red and blue, with a green-sensitive plate for the green exposure, such as 23 or 33.' No. 28, the Perchromo plate of Perutz which is manufactured after the receipt of Miethe and Traube, is said by these authors to give the relative sensibility of the three exposures, as, 1 for the red, ½ for the green, 1 for the blue. Allowing for the density of the different screens it would appear from the spectrogram that these figures are correct. The general sensibility of the plate is, however, not great. A surprising green sensibility is shown in No. 36, the only film tested

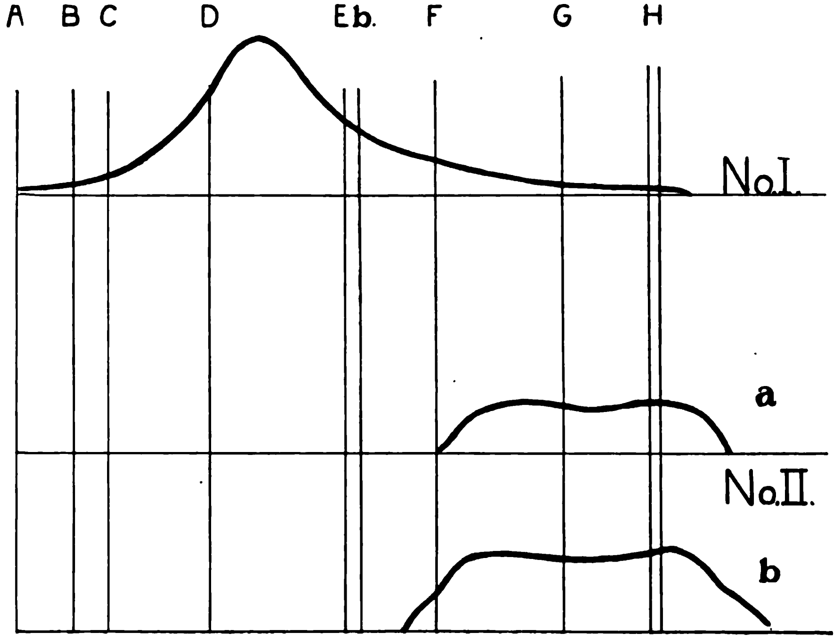
This variety would require a deep yellow screen to correct the blue sensibility.

The appended curves are plotted from what we considered to be a normal exposure. It is somewhat hard to say how much farther into the red the curves could be made to extend by longer exposure, as the portion of the plate covered by the spectrum gradually becomes affected by reflected light as the exposure is lengthened, making it difficult to determine with exactness just how much of the action is due to direct light and how much to reflected.

I wish to express my thanks to Dr. Gaylord for suggestions leading up to and during the course of this work.

I. Frauhofer luminosity curve.
II. Ordinary gelatine bromide plate.
1. Dr. Smith's Swiss plates.
2. Hauff orthochromatic, extra sensitive.
3. Hauff orthochromatic, isolar.
4. Bremer orthochromatic.
5. Bremer isolar and orthochromatic.
6. Steinschneider's erythrosin orthochromatic.
7. Sandell color sensitive, isolar.
8. Sacs plain orthochromatic.
9. Sacs plain orthochromatic, isolar.
10. A. G. F. A. plain orthochromatic.
11. A. G. F. A. orthochromatic, isolar.
12. Kuzka plain orthochromatic.
13. Mather permanent orthochromatic.
14. Lumiere A green sensitive.
15. Lumiere B red sensitive.
16. Talbot orthochromatic.
17. Lomberg plain (non orthochromatic).
18. Badische erythrosin.
19. Apollo plain orthochromatic.
20. Weisendorph and Weimer plain orthochromatic.
21. Weisendorph yellow sensitive erythrosin.
22. Dr. Schleussner's plain orthochromatic.
23. Dr. Schleussner's " Viridin," yellow green.

24. Herzog plain orthochromatic.
25. Schippang's F erythrosin silver process plates. color sensitive.
26. Schippang's B erythrosin silver.
27. Schippang's B erythrosin.
28. Perutz perchromo.
29. Perutz perxanto.
30. Perutz perorto.
31. Perutz eosin silver.
32. Seed's orthochromatic.
33. Cramer's orthochromatic.
34. Forbes orthochromatic.
35. Eastman's " Kodoid " orthochromatic film.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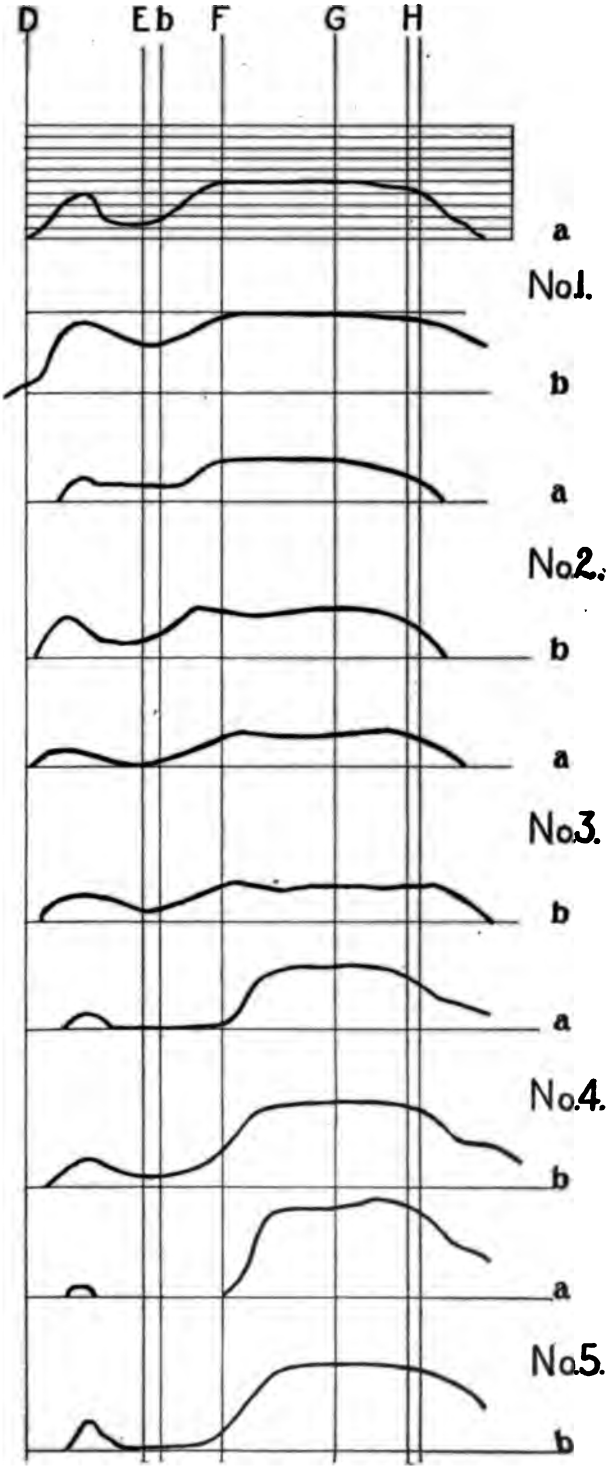
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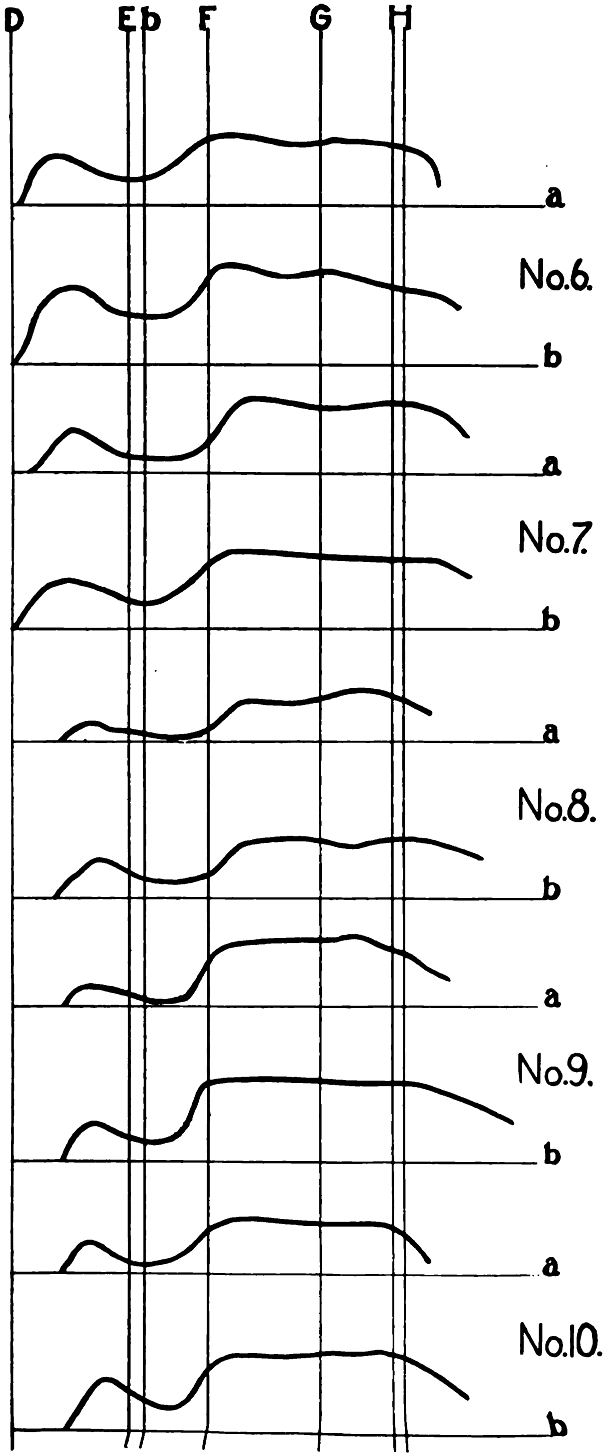
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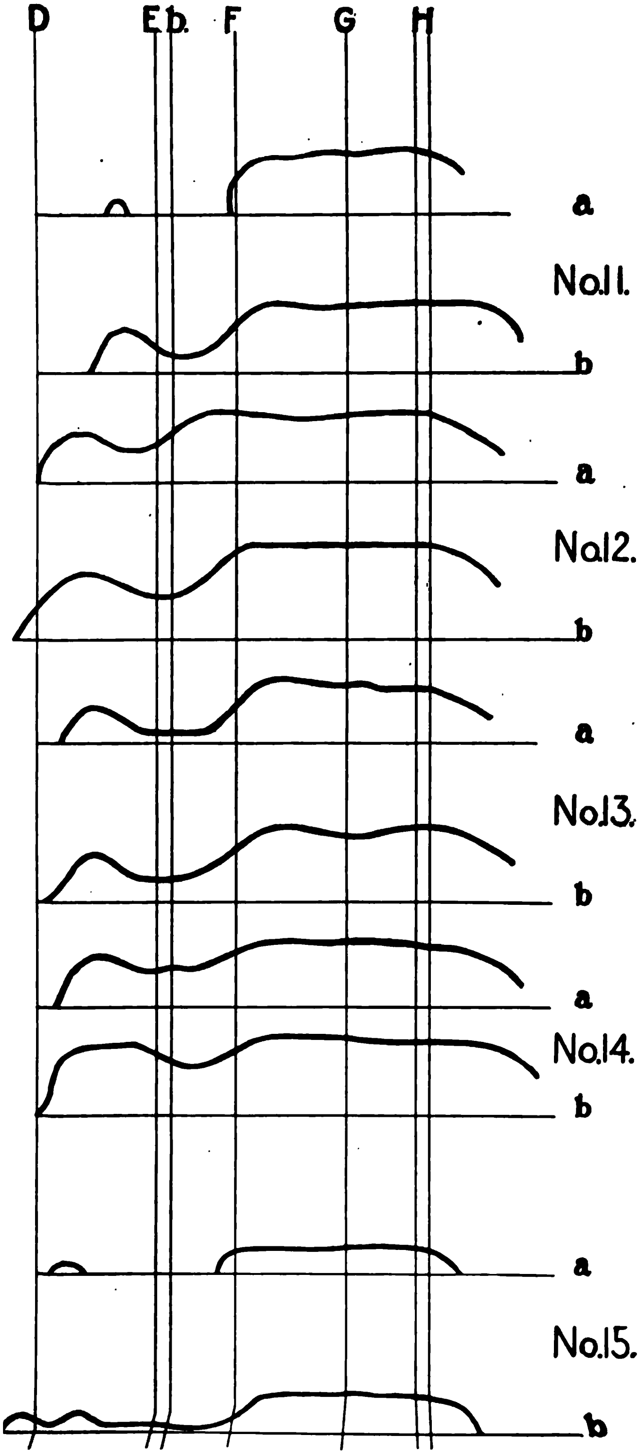
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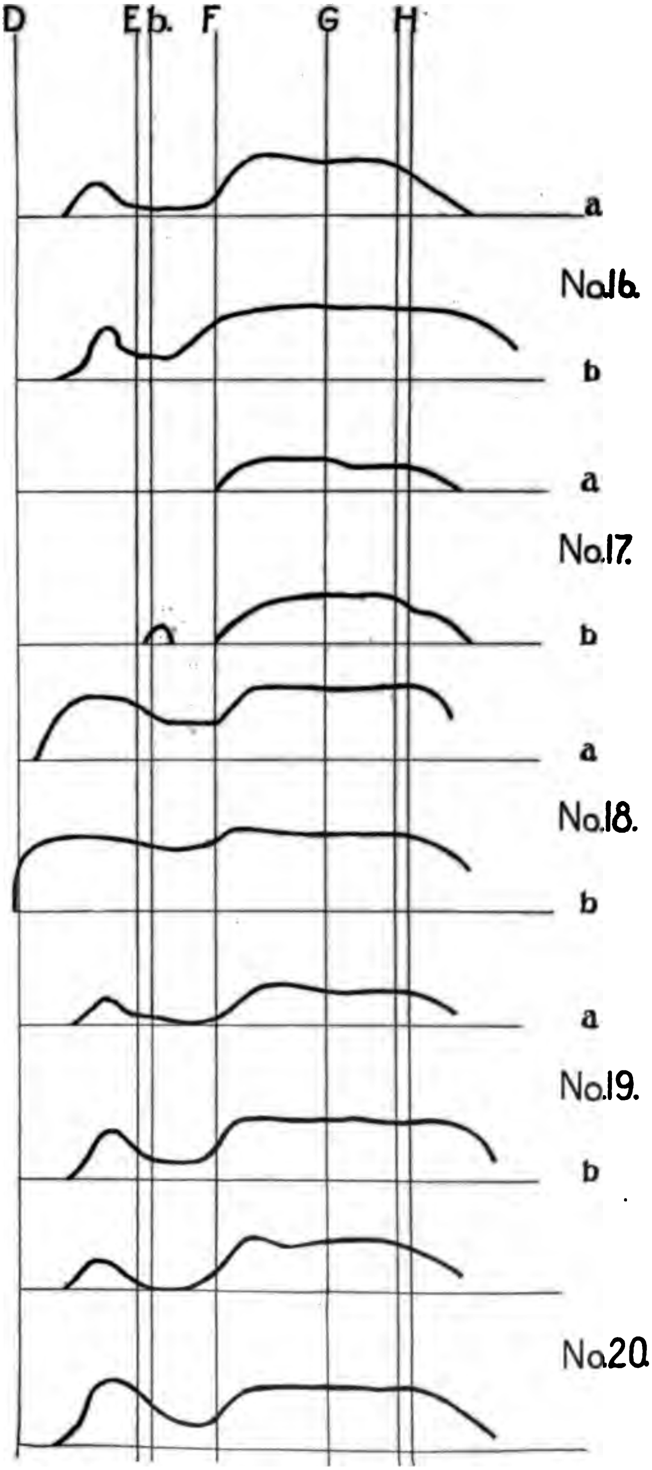
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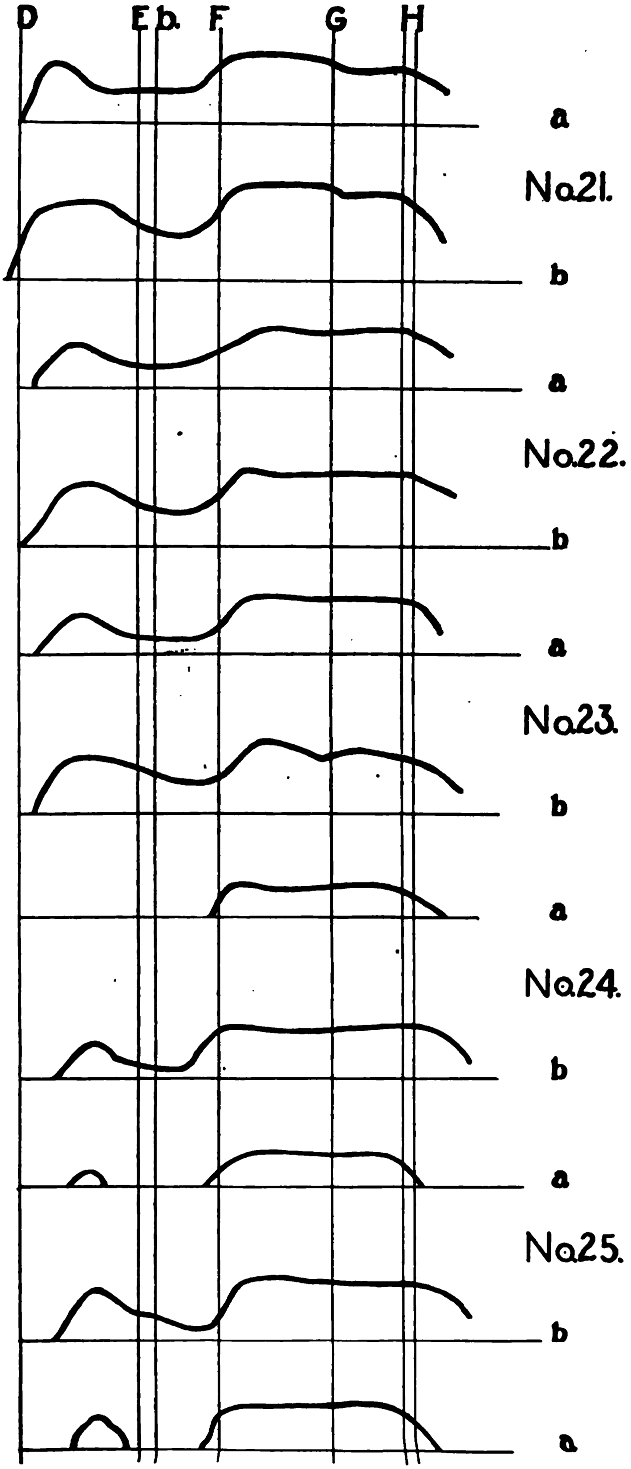
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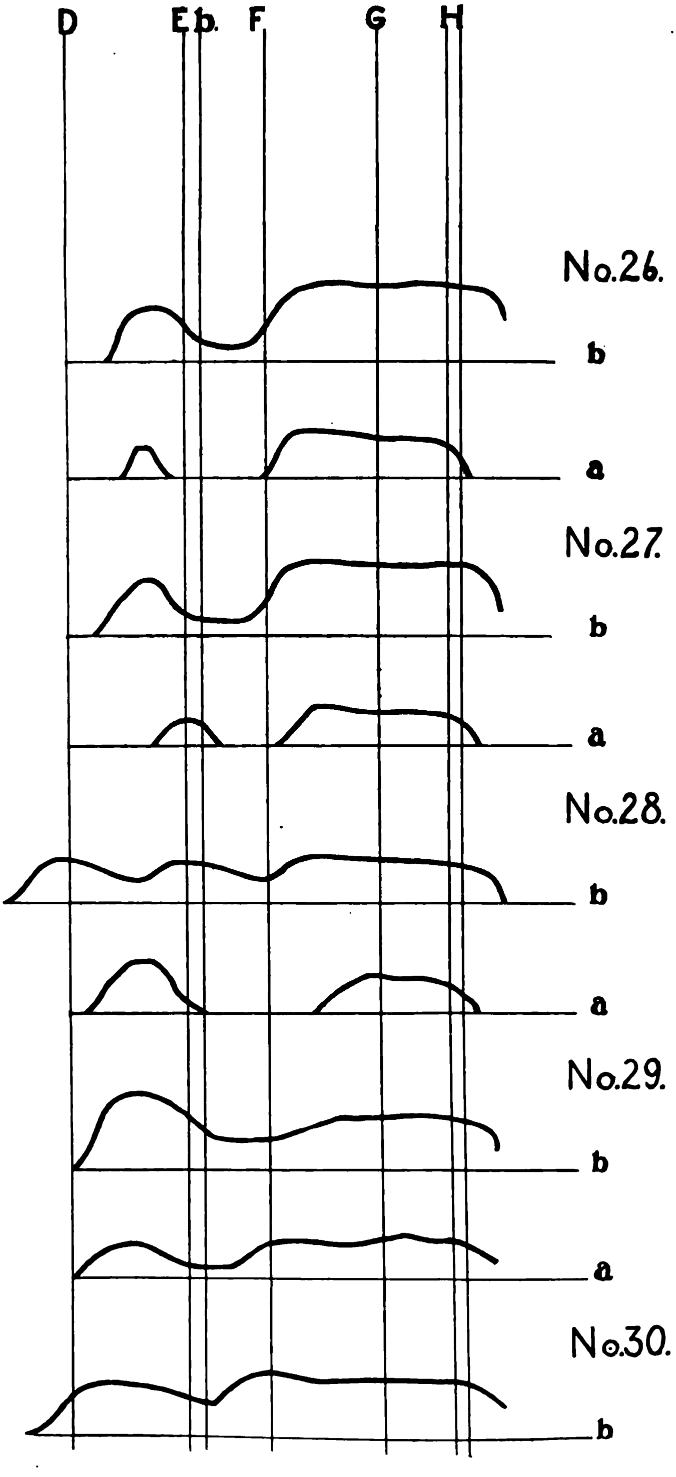
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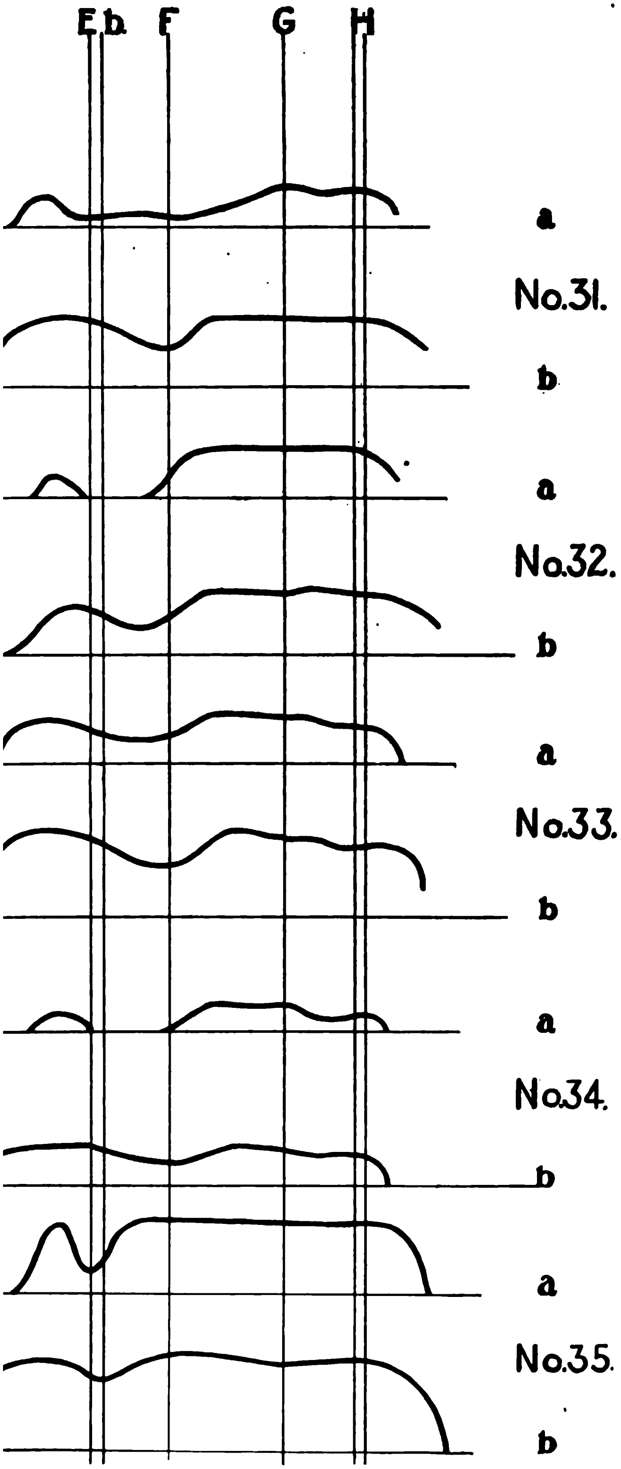
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SANITARY CONDITION OF THE STATE

AND

SUMMARY OF MORTALITY REPORTED DURING THE YEAR.

Sanitary Condition of the State and Summary of Mortality Reported During 1902.

By F. C. Curtis, M. D.

The recorded mortality of the state during the year shows a death rate of 17.0 per 1,000 population, against an average of 18.0 for the five years preceding. There were 5,000 fewer deaths than in either 1900 or 1901; fewer deaths than occurred in either of the years 1891, 1892 or 1893; and more deaths by about 4,000 than occurred in any of the years between 1893 and 1900. The actual mortality was almost identical with the average of the past five years.

The *infant mortality*, which is a good measure of salubrity, was very low, 25.3 per cent of the deaths occurring under the age of five years, against an average of 29.2. This is the lowest ratio of any year on record in this state.

The common zymotic, or preventable, diseases caused 14.0 per cent of the mortality of the year. In a series of years this has varied between 12.0 and 18.0. Of these, cerebro-spinal meningitis, typhoid fever, malarial diseases, erysipelas and diphtheria caused fewer deaths than last year or than the average of the five preceding years; while smallpox, scarlet fever, measles, whooping cough and diarrheal diseases caused more deaths than the average.

Compared with the year preceding, 1901, cerebro-spinal meningitis, typhoid fever, malarial diseases, scarlet fever, diphtheria and diarrheal diseases caused fewer deaths; measles and whooping cough were increased and smallpox had the same prevalence and mortality.

TOTALS OF MORTALITY, CLASSIFIED BY CAUSES, FOR 10 YEARS 1893–1902, AND AVERAGE YEARLY MORTALITY

YEARS	Total number of deaths	Representing average daily death rate of	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
1893	123,908	340	41,643	33.6	180	875	1,685	493	252	1,626	789	366	1,203
1894	118,195	324	41,472	35.0	185	489	1,640	422	308	1,227	900	331	1,020
1895	121,735	336	42,003	34.5	165	546	1,716	409	11	850	1,266	370	1,169
1896	120,683	330	40,136	34.5	156	510	1,542	449	3	759	1,495	340	906
1897	117,078	321	35,771	32.6	140	538	1,351	380	27	841	873	303	825
1898	120,972	331	37,113	30.2	136	695	1,810	404	1	837	838	237	1,155
1899	121,821	333	35,386	29.0	120	702	1,604	248	21	730	756	353	886
1900	128,468	352	39,204	30.5	137	531	1,948	309	14	689	1,333	466	1,020
1901	129,257	354	35,755	28.0	145	402	1,741	283	445	1,430	859	363	721
1902	123,494	338	31,215	25.3	140	456	1,318	189	442	1,215	929	314	923
Average for 10 years.	122,500	330	37,970	31.0	150	585	1,635	360	155	1,020	925	315	1,000

TOTALS OF MORTALITY, CLASSIFIED BY CAUSES, ETC.—(*Concluded*)

YEARS	Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1893	5,947	9,056	19,807	13,123	1,054	8,834	6,955	9,042	13,826	3,232	5,295	5,826	14,622
1894	6,592	8,956	15,885	12,824	911	8,745	6,947	8,451	12,948	3,305	5,487	5,197	15,310
1895	4,989	9,055	17,725	13,267	939	8,892	7,449	9,966	11,724	3,554	5,889	5,569	16,380
1896	4,597	8,776	16,820	13,265	972	8,955	7,770	10,486	11,925	3,789	7,022	5,377	14,835
1897	4,115	7,267	16,277	12,641	1,013	8,963	7,866	10,905	12,124	4,131	6,172	5,516	11,950
1898	2,612	8,499	16,350	12,979	920	10,101	8,641	10,511	13,312	4,385	6,520	5,524	14,641
1899	2,786	6,480	17,938	13,412	877	10,163	9,064	10,606	13,177	4,533	6,093	6,068	15,324
1900	3,306	7,959	19,232	13,590	1,136	10,644	9,501	10,676	12,993	4,871	6,714	5,402	16,131
1901	3,026	9,337	17,589	13,766	1,068	7,178	9,558	11,919	13,366	5,033	7,926	5,429	17,388
1902	2,859	8,315	16,986	12,582	1,031	7,235	9,604	12,889	12,964	4,990	7,058	4,919	15,833
Average for 10 years	4,085	8,570	17,500	13,125	1,000	9,011	8,340	10,550	12,836	4,182	6,420	5,517	15,512

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR.

DISTRICTS	Total number of deaths	Representing annual death rate per 1000 population of	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years or over	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
Maritime district*	73,325	18.6	25,494	34.8	7,310	170	264	809	138	322	968	737	193	661
Hudson valley district	11,070	16.0	2,150	19.5	2,533	190	35	251	25	14	50	20	14	88
Adirondack and Northern district	4,981	13.0	937	16.7	1,454	90	30	99	5	9	28	25	14	24
Mohawk valley district	6,086	15.0	1,252	21.0	1,609	100	26	84	1	2	77	16	11	10
Southern tier district	5,811	14.0	987	17.0	1,807	95	19	101	6	6	30	29	23	20
East central district	5,481	14.0	852	16.5	1,765	70	20	72	1	.....	9	10	13	30
West central district	4,448	14.0	593	13.3	1,577	70	12	50	8	6	5	3	15	23
Lake Ontario and Western district	12,292	14.0	2,930	23.8	2,753	125	50	252	5	83	48	89	31	67

☞ * *Maritime district:* Includes New York, Brooklyn, Long Island, Staten Island and Westchester county. *Hudson valley district.* All the counties on either side of the Hudson river, except Westchester, to and including Albany and Rensselaer. *Adirondack and Northern district:* The northern section of the state—the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk valley district:* Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern tier district:* The seven counties along the southern border of the State. *East central district:* Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West central district:* Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western district:* Oswego, Wayne, Monroe Orleans, Niagara and Erie counties.

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR—(*Concluded*)

DISTRICTS	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
Maritime district*	2,111	6,187	11,798	8,080	662	3,242	6,141	6,438	5,970	2,557	4,074	1,307	10,666
Hudson valley district	175	467	1,279	1,180	61	837	811	1,458	1,493	497	629	594	1,092
Adirondack and Northern district	46	167	459	521	42	399	311	591	681	229	262	469	570
Mohawk valley district	121	264	631	517	38	506	426	706	859	282	401	440	668
Southern tier district	121	198	574	431	49	510	407	787	830	259	350	512	519
East central district	44	182	514	482	51	478	415	786	783	306	284	441	560
West central district	33	156	430	341	30	351	288	710	678	246	251	399	413
Lake Ontario and Western district	208	691	1,301	1,030	101	913	805	1,412	1,670	624	807	787	1,315

* *Maritime district:* Includes New York, Brooklyn, Long Island, Staten Island and Westchester county. *Hudson valley district:* All the counties on either side of the Hudson river, except Westchester, to and including Albany and Rensselaer. *Adirondack and Northern district:* The northern section of the state—the counties of Washington Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk valley district:* Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern tier district:* The seven counties along the southern border of the state. *East central district:* Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West central district:* Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western district:* Oswego, Wayne, Monroe, Orleans Niagara and Erie counties.

RELATIVE URBAN AND RURAL DEATH RATE IN THE SANITARY DISTRICTS

DISTRICTS	Area in square miles	Population per square mile	Total death rate	Urban death rate*	Rural death rate†	PERCENTAGE OF DEATHS	
						Under 5 years of age	At 70 years of age and over
Maritime	2,286	1,728	18.6	18.7	18.5	34.8	10.0
Hudson valley	5,872	118	16.0	18.0	15.0	19.5	22.5
Adirondack and Northern	15,080	26	13.0	15.0	12.0	16.7	29.0
Mohawk valley	4,731	86	15.0	19.0	13.5	21.0	26.5
Southern tier	6,545	66	14.0	15.0	13.0	17.0	31.0
East central	6,555	62	14.0	14.0	14.0	16.5	30.0
West central	4,746	67	14.0	15.5	13.0	13.3	35.5
Lake Ontario and Western	4,378	200	14.0	14.6	13.5	23.8	22.5
Entire state	50,200	150	17.0	17.5	15.5	25.3	17.0

* Namely in cities of 25,000 population and over. † In towns and places of less than 25,000 population.

RELATIVE MORTALITY FROM CHIEF CAUSES IN SANITARY DISTRICTS

DISTRICTS	In Each 1,000 Deaths from all Causes there were from—						
	Zymotic diseases	Typhoid fever	Scarlet fever	Diphtheria and croup	Diarrheal diseases	Consumption	Acute respiratory diseases
Maritime	170	11	13	28	85	110	160
Hudson valley	100	23	5	16	42	107	117
Adirondack and Northern	90	20	6	9	33	105	92
Mohawk valley	100	14	13	20	44	85	105
Southern tier	95	17	5	21	34	75	100
East central	70	13	2	8	33	90	95
West central	70	11	1	8	25	77	95
Lake Ontario and Western	125	20	4	17	56	85	105
Entire state	140	14	11	23	67	102	138

TOTALS OF MORTALITY OF THE STATE, BY MONTHS

1902	Total number of deaths	Representing annual death rate per 1000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
January	10,968	17.3	2,933	26.8	2,015	103	48	146	16	39	141	132	42	58
February	10,670	18.6	2,890	27.0	1,903	102	47	63	14	51	162	166	34	72
March	10,935	17.5	2,936	27.0	1,895	98	44	112	16	51	131	138	33	69
April	10,772	17.5	2,444	22.5	1,914	100	42	103	12	61	142	122	44	85
May	10,616	17.0	2,778	26.5	1,837	105	46	99	20	52	175	104	32	83
June	9,419	15.5	2,790	29.5	1,128	150	36	99	16	70	111	100	28	86
July	10,938	17.5	4,132	38.5	1,565	250	54	107	21	34	76	57	23	115
August	10,632	17.0	4,024	38.0	1,474	250	40	165	21	10	39	28	14	110
September	9,682	15.8	3,218	32.6	1,504	195	30	179	20	6	31	7	15	83
October	9,475	15.0	2,537	27.0	1,611	132	34	225	18	4	56	17	6	61
November	9,010	14.7	2,086	23.2	1,595	100	15	208	10	20	63	19	10	44
December	10,347	16.5	2,447	23.6	1,958	97	20	182	5	44	85	39	33	57
Total for the year	123,494	17.0	31,215	25.3	20,709	140	456	1,318	189	442	1,215	929	314	923
Average for 5 years past	123,525	18.0	36,035	29.2	20,050	130	589	1,691	325	100	906	933	346	923
Totals for 1901	129,257	17.8	35,775	28.0	22,233	145	492	1,741	283	445	1,430	859	363	721

TOTALS OF MORTALITY OF THE STATE, BY MONTHS—*(Concluded)*

1902	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
January	320	188	2,274	1,038	99	645	853	1,234	1,103	384	500	448	1,260
February	264	180	2,241	1,100	97	558	823	1,189	1,161	375	457	412	4,174
March	247	227	1,951	1,235	120	606	911	1,167	1,176	406	487	442	1,363
April	268	231	1,716	1,154	108	644	872	1,188	1,241	439	515	414	1,371
May	243	259	1,673	1,135	86	586	885	1,179	1,098	501	633	388	1,339
June	228	636	944	980	74	570	758	1,041	949	411	646	338	1,328
July	180	2,038	752	1,038	86	632	741	953	1,000	434	745	385	1,467
August	161	2,089	664	984	80	608	728	865	994	443	733	365	1,491
September	166	1,390	835	917	80	622	686	899	995	314	589	512	1,306
October	215	613	985	1,027	61	610	777	1,040	1,039	416	571	406	1,294
November	248	254	1,327	951	61	541	689	997	1,043	519	625	374	1,092
December	319	210	1,624	1,023	82	613	881	1,137	1,165	458	557	465	1,348
Total for the year	2,859	8,315	16,986	12,582	1,034	7,235	9,604	12,889	12,964	1,990	7,058	4,949	15,833
Average for 5 years past	3,171	7,910	17,482	13,270	1,002	9,471	8,924	10,931	12,997	4,390	6,684	5,594	15,686
Totals for 1901	3,026	9,337	17,589	13,766	1,068	7,478	9,558	11,949	13,366	5,033	7,926	5,439	17,388

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
January.												
1888.......	8,742	2,848	32.5	176	37	64	71	21	265	55	35	40
1889.......	8,337	2,983	35.2	170	35	89	51	15	242	164	29	105
1890.......	13,020	2,207	18.2	89	29	117	62	.....	93	42	39	114
1891.......	9,549	2,868	30.0	132	47	138	44	1	182	140	30	92
1892.......	13,460	3,216	24.1	107	58	116	38	2	294	80	51	48
1893.......	10,490	3,056	29.1	137	44	120	34	15	237	86	52	94
1894.......	10,948	3,088	28.2	124	53	295	30	4	146	122	35	55
1895.......	10,980	3,123	28.6	100	51	108	30	3	103	34	28	78
1896.......	10,176	3,064	30.0	129	49	158	22	1	113	199	31	73
1897.......	9,587	2,664	27.7	104	42	108	26	.....	76	70	28	58
1898.......	9,632	2,416	25.0	95	34	122	26	.....	123	112	21	44
1899.......	12,421	2,590	21.0	65	52	111	12	1	71	51	43	77
1900.......	10,552	2,788	25.5	94	29	144	17	.....	75	154	43	79
1901.......	12,524	2,557	20.5	84	38	192	14	10	108	59	33	56
1902.......	10,968	2,933	26.8	103	48	146	16	39	141	132	42	58
February:												
1888.......	8,637	2,748	32.0	154	44	84	49	10	239	55	39	49
1889.......	8,183	2,933	35.8	170	32	71	30	9	324	136	30	119
1890.......	9,130	2,370	27.5	118	37	94	39	.....	96	50	32	92
1891.......	8,704	2,813	32.5	141	41	127	32	.....	203	127	58	81
1892.......	10,755	3,139	29.2	123	53	98	33	7	290	89	79	41
1893.......	9,333	2,774	29.6	136	46	101	29	23	198	80	58	121
1894.......	9,417	2,943	30.2	125	42	86	24	52	139	125	41	50
1895.......	10,771	3,049	28.3	85	40	99	9	5	98	44	38	87
1896.......	9,825	2,892	29.5	116	31	121	28	.....	110	192	45	52
1897.......	9,826	2,743	28.0	97	32	98	23	.....	84	89	26	75
1898.......	9,213	2,543	27.5	91	53	104	22	.....	93	84	32	47
1899.......	10,763	2,506	23.5	70	45	116	20	1	87	37	36	76
1900.......	10,796	3,142	29.1	107	49	122	18	.....	119	206	53	91
1901.......	11,022	2,482	22.6	86	41	114	11	35	126	74	54	52
1902.......	10,670	2,890	27.0	102	47	93	14	51	162	166	34	72
March:												
1888.......	9,405	2,788	30.0	147	49	74	56	35	239	56	48	48
1889.......	9,547	3,381	35.4	167	43	69	47	1	386	150	33	157
1890.......	9,844	2,772	30.0	117	47	72	36	2	90	94	47	110
1891.......	10,672	3,108	29.2	115	63	121	42	.....	195	157	50	104
1892.......	10,978	2,342	21.3	124	77	96	37	3	285	114	70	48
1893.......	12,000	3,419	28.5	120	89	115	37	29	221	76	41	166
1894.......	10,196	3,215	31.5	107	52	13	26	47	179	164	46	95
1895.......	11,379	3,340	29.4	98	53	99	23	.....	131	99	51	83
1896.......	11,080	3,255	29.6	103	54	103	20	1	76	251	47	77
1897.......	11,574	3,281	20.2	92	55	83	26	2	99	113	45	121
1898.......	10,300	2,860	28.0	96	73	119	23	.....	108	144	24	89
1899.......	11,065	2,807	25.2	75	82	121	12	1	98	61	40	73
1900.......	13,033	3,574	27.4	93	50	120	23	.....	94	202	86	129
1901.......	11,913	3,070	25.8	94	61	111	6	39	200	100	50	57
1902.......	10,935	2,936	27.0	98	44	112	16	51	134	138	33	69
April:												
1888.......	8,129	2,468	30.0	150	75	45	52	40	250	77	34	48
1889.......	9,078	3,116	34.5	174	45	78	64	2	363	148	47	137
1890.......	9,188	2,826	30.8	121	51	73	43	1	78	187	43	77
1891.......	13,981	2,809	27.3	92	67	103	48	1	273	150	42	106
1892.......	10,500	3,245	30.7	128	76	77	40	11	248	161	63	80
1893.......	11,865	3,339	28.1	111	104	111	34	23	199	73	55	133
1894.......	9,945	3,147	31.5	135	55	94	33	54	184	148	19	104
1895.......	10,545	3,506	33.3	115	78	115	32	.....	116	133	62	107
1896.......	10,480	3,246	31.0	111	50	87	33	.....	81	234	62	8
1897.......	10,325	2,813	27.3	95	55	79	27	7	81	98	44	90
1898.......	10,000	2,763	24.3	93	82	80	28	.....	84	126	29	118
1899.......	10,383	2,627	25.9	77	90	101	20	2	78	68	40	65
1900.......	12,486	3,376	27.1	86	61	98	23	1	92	191	94	117
1901.......	10,035	2,892	26.2	107	59	120	16	42	219	109	62	78
1902.......	10,772	2,444	22.5	100	42	102	12	61	142	122	44	85

FOR FIFTEEN YEARS

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
879	78	1,563	1,089	105	481	482	553	916	203	278	882	715
606	101	1,473	1,061	77	421	469	677	946	144	279	507	896
534	98	3,847	1,801	95	542	553	724	1,107	277	333	603	1,969
489	103	1,761	1,210	81	533	548	737	1,041	220	288	523	1,251
659	94	3,801	1,286	125	686	541	953	1,339	295	362	1,183	1,149
613	141	2,293	1,099	137	568	607	866	1,128	260	339	515	1,243
680	87	2,479	1,220	103	618	664	812	1,164	258	361	707	1,285
547	108	2,578	1,244	81	617	622	916	1,067	290	403	506	1,586
530	127	2,015	1,152	91	614	688	934	959	302	304	464	1,305
476	112	1,762	1,050	83	592	658	964	1,005	322	437	503	1,234
323	113	1,765	1,051	91	642	739	1,013	1,032	346	400	467	1,168
255	127	2,965	1,304	76	735	818	1,116	1,386	351	400	917	1,553
352	95	2,000	1,140	121	686	838	968	1,138	382	461	460	1,270
345	196	2,270	1,326	98	629	877	1,114	1,223	440	544	648	1,804
320	188	2,274	1,038	99	645	853	1,234	1,103	384	500	448	1,260

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
667	85	1,614	1,112	105	437	434	563	878	193	233	1,042	674
563	75	1,477	947	100	301	461	574	921	183	256	507	896
518	82	1,950	1,304	74	477	415	536	927	209	264	515	1,399
419	121	1,683	958	107	567	522	672	1,008	205	290	514	1,007
538	99	2,315	1,196	113	620	564	813	1,218	232	340	770	1,247
430	141	1,910	954	102	602	554	779	1,102	218	279	496	1,080
527	89	1,940	1,063	87	578	550	728	1,152	227	288	499	1,175
391	107	2,526	1,161	48	600	670	917	1,035	281	351	598	1,621
444	114	2,012	1,084	100	577	690	879	942	303	398	502	1,151
370	134	1,996	1,117	73	614	628	956	1,071	351	403	495	1,176
275	119	1,738	1,031	75	673	754	768	1,123	309	337	483	1,098
236	101	2,329	1,204	64	651	765	1,045	1,200	320	412	710	1,308
352	137	2,402	1,131	107	543	873	866	1,109	396	471	463	1,285
240	200	2,292	1,130	114	614	832	1,095	1,135	371	403	603	1,486
234	180	2,241	1,100	97	558	823	1,189	1,161	375	457	412	1,174

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
668	107	1,732	1,218	137	441	422	593	970	204	280	1,090	916
590	115	1,840	1,195	109	468	488	662	1,094	228	237	624	1,092
514	94	1,929	1,238	99	511	471	709	1,050	235	314	520	1,663
413	104	2,307	1,318	112	613	611	774	1,165	283	290	696	1,270
531	108	2,390	1,272	137	638	583	802	1,305	276	823	690	1,392
517	168	2,451	1,286	131	699	695	885	1,330	303	334	589	1,344
546	124	1,814	1,190	110	638	633	760	1,196	262	346	476	1,366
445	137	2,395	1,274	104	691	721	971	1,160	312	417	714	1,499
370	142	2,310	1,490	121	695	744	1,031	1,180	316	414	586	1,050
377	146	2,485	1,290	117	672	737	1,136	1,208	375	441	615	1,531
231	123	1,872	1,666	89	718	810	901	1,251	382	480	511	1,186
220	126	2,145	1,284	81	726	838	1,052	1,290	418	419	588	1,390
342	167	3,137	1,368	160	689	984	1,132	1,301	448	437	591	1,585
277	215	2,522	1,293	122	644	884	1,116	1,324	409	409	532	1,542
247	227	1,951	1,235	120	606	911	1,167	1,176	406	487	442	1,263

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
448	113	1,332	1,117	90	407	404	549	966	186	265	768	890
580	122	1,656	1,092	125	429	478	574	986	222	311	590	1,029
436	97	1,781	1,138	75	599	484	691	1,046	220	330	480	1,578
370	122	4,357	1,377	92	596	645	869	1,348	271	418	901	1,816
491	131	2,051	1,252	126	686	576	822	1,294	240	400	466	1,233
444	143	2,943	1,329	124	678	637	865	1,413	304	402	572	1,279
571	117	1,748	1,091	85	688	604	741	1,102	298	409	501	1,319
424	151	2,135	1,320	83	666	653	917	1,017	282	433	494	1,425
345	187	2,124	1,189	98	635	641	919	1,080	320	480	471	1,356
360	137	1,893	1,158	105	646	742	979	1,167	375	455	517	1,359
252	137	1,869	1,100	91	671	782	884	1,218	333	435	481	1,200
197	138	1,895	1,387	98	760	820	997	1,206	346	430	552	1,318
277	117	2,962	1,302	125	852	860	1,080	1,270	410	469	578	1,509
273	200	1,899	1,296	101	613	867	1,058	1,268	423	481	447	1,404
268	231	1,716	1,154	108	644	872	1,188	1,241	439	515	414	1,371

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
May:												
1888........	9,032	2,891	42.1	141	62	59	68	42	277	109	50	49
1889........	8,357	2,773	33 1	155	42	63	37	.....	276	108	40	121
1890........	9,194	2,740	31.6	130	62	72	55	.....	60	200	34	68
1891........	10,213	2,917	28.6	117	57	88	35	.....	252	184	37	79
1892........	10,223	3,289	32.3	139	69	71	50	13	245	254	56	69
1893........	10,718	3,080	28.7	128	159	93	40	21	193	92	43	127
1894........	9,286	2,862	30.8	139	53	85	29	37	140	97	36	97
1895........	9,452	2,888	30.5	116	46	92	38	1	83	183	36	77
1896........	9,541	2,842	30.0	119	51	59	38	1	78	172	40	100
1897........	9,266	2,469	27.0	103	51	65	44	7	98	119	35	62
1898........	9,748	2,690	27.0	93	81	86	27	.....	113	109	30	112
1899........	9,556	2,366	25.0	79	71	93	14	5	76	85	45	37
1900........	10,938	3,160	29.0	93	51	102	28	1	70	161	52	119
1901........	10,327	2,640	25.4	112	43	96	15	67	226	95	44	69
1902........	10,616	2,778	26.2	105	46	99	20	52	175	104	32	83
June:												
1888........	8,368	3,306	39.7	227	40	45	59	11	233	130	25	61
1899........	8,370	3,632	43.4	241	27	45	59	.....	154	64	20	120
1890........	9,185	3,515	40.2	217	28	69	52	1	68	161	29	90
1891........	9,321	3,615	38.8	186	42	80	46	.....	207	133	41	65
1892........	9,075	3,437	37.7	188	57	5	62	10	183	255	37	59
1893........	8,728	2,885	33.0	162	96	83	42	10	154	99	24	77
1894........	9,805	3,588	36.6	182	32	72	43	24	121	60	15	79
1895........	8,736	3,114	35.6	175	40	81	35	.....	71	217	28	95
1896........	9,342	3,466	37.0	183	44	66	37	.....	50	140	22	85
1897........	9,018	2,865	31.5	140	51	66	31	7	82	86	31	74
1898........	8,637	2,458	30.0	122	104	70	22	.....	82	99	17	111
1899........	9,433	3,104	33.0	146	62	80	22	7	71	102	31	73
1900........	9,444	3,101	33.0	120	39	65	26	1	44	120	40	71
1901........	9,500	2,500	26.3	133	42	83	27	74	165	95	27	54
1902........	9,449	2,790	29.5	150	36	99	16	70	111	100	28	86
July:												
1888........	10,300	5,363	52.0	380	35	73	51	2	141	111	23	108
1889........	10,806	5,563	51.4	252	46	117	61	1	69	33	14	112
1890........	[illegible],606	5,602	50.5	327	56	101	56	.....	45	91	12	133
1891........	11,370	5,782	50.8	329	57	97	44	.....	181	93	19	48
1892........	13,555	6,855	52.1	340	59	131	67	8	75	150	20	136
1893........	12,337	6,246	50.5	324	86	87	45	16	79	75	13	92
1894........	12,516	6,160	50.0	335	50	93	44	19	76	55	14	121
1895........	11,681	5,841	50.0	326	49	108	26	.....	32	130	20	143
1896........	12,558	6,192	49.0	305	64	103	50	.....	55	85	12	117
1897........	11,235	5,086	45.5	272	54	87	36	4	69	76	16	66
1898........	11,441	4,945	43.0	255	68	89	24	.....	59	52	13	176
1899........	11,291	4,819	42.6	239	56	94	34	1	45	82	21	101
1900........	11,641	4,728	40.6	235	53	101	17	1	43	92	22	113
1901........	12,248	4,344	35.5	236	51	99	24	89	105	81	17	71
1902........	10,938	4,132	38.5	250	54	107	21	34	76	57	23	115
August.												
1888........	10,017	4,867	48.7	345	29	174	87	6	120	73	9	144
1889........	9,373	4,059	40.7	280	33	224	96	.....	54	22	10	133
1890........	10,642	4,480	48.8	292	49	167	86	.....	35	69	11	153
1891........	10,720	4,829	45.0	297	38	171	67	.....	120	41	14	64
1892........	10,903	4,933	45.2	292	54	182	56	18	61	51	19	138
1893........	11,037	4,954	45.0	298	55	157	62	11	63	44	14	129
1894........	10,399	4,634	44.8	283	44	183	41	6	48	19	17	129
1895........	11,050	4,562	45.0	282	46	156	39	.....	26	76	17	156
1896........	12,475	4,789	58.4	246	43	171	48	.....	19	54	20	132
1897........	10,084	4,021	40.0	240	38	124	41	.....	19	40	13	84
1898........	11,302	4,811	42.5	255	40	181	49	.....	26	26	16	162
1899........	10,003	3,096	37.0	216	64	157	23	.....	26	49	15	120
1900........	11,047	4,223	38.3	237	47	174	37	2	22	49	11	86
1901........	10,999	4,339	40.0	285	43	168	36	40	49	40	9	80
1902........	10,632	4,024	38.0	250	40	165	21	10	39	28	14	110

for Fifteen Years — (*Continued*)

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
627	131	1,438	1,095	98	458	481	570	1,069	211	370	738	988
492	123	1,172	1,102	86	511	421	599	951	227	377	548	1,061
420	142	1,538	1,077	95	539	508	691	999	273	371	436	1,554
339	127	2,138	1,234	114	561	555	741	1,021	248	434	629	1,349
480	113	1,972	1,207	108	617	601	736	1,159	270	461	443	1,180
489	175	1,944	1,139	86	660	664	834	[illegible]	286	544	508	1,284
585	136	1,333	1,093	93	644	577	745	1,056	265	487	427	1,271
390	157	1,459	1,149	83	628	669	903	1,022	270	508	413	1,250
292	205	1,474	1,193	93	647	644	852	1,066	326	555	400	1,155
368	113	1,357	1,054	80	637	716	935	1,001	386	478	449	1,211
223	127	1,576	1,127	84	695	757	915	1,171	375	478	489	1,193
203	122	1,389	1,169	93	716	763	912	1,117	359	555	484	1,249
290	157	1,899	1,284	96	785	797	983	1,200	392	581	492	1,405
263	236	1,406	1,224	92	649	769	1,114	1,195	434	590	415	1,285
243	259	1,673	1,135	86	586	885	1,179	1,098	501	633	388	1,139
490	811	778	868	94	516	393	491	1,075	237	411	472	1,120
423	1,112	744	919	77	639	386	485	951	222	376	414	1,128
364	1,087	972	984	83	679	497	541	1,000	237	452	347	1,433
319	808	1,098	978	103	720	479	678	1,127	224	534	353	1,286
309	676	1,000	1,005	89	692	449	693	1,132	248	545	368	1,080
359	478	1,010	1,065	67	612	503	679	1,108	240	560	384	1,073
575	739	1,037	982	84	723	583	718	1,180	307	628	419	1,334
388	627	825	974	63	665	592	718	927	275	620	357	1,188
362	915	877	1,097	69	793	625	782	947	290	551	385	1,205
354	503	945	1,002	83	784	648	864	1,037	325	530	362	1,178
174	372	857	1,007	96	783	656	780	1,031	367	581	361	1,062
236	686	883	1,028	76	869	709	746	1,087	408	661	409	1,192
243	477	1,058	1,070	90	874	705	807	1,057	397	637	358	1,265
246	450	905	1,111	97	596	751	957	981	418	723	379	1,289
228	636	944	980	74	570	758	1,041	949	411	646	338	1,328
411	2,957	588	966	73	784	383	492	930	210	397	454	1,111
305	3,092	537	1,012	63	844	449	542	1,029	227	357	502	1,394
293	2,916	706	1,073	60	1,024	497	543	1,092	242	553	395	1,718
304	2,906	717	1,032	67	1,036	502	652	1,158	209	458	363	1,397
849	3,629	801	1,093	96	1,264	556	700	1,618	266	842	447	1,503
379	3,206	746	1,073	72	1,219	552	729	1,252	300	598	383	1,333
470	3,258	688	1,094	64	1,184	527	638	1,282	296	683	392	1,468
323	2,974	627	1,040	83	1,135	599	732	1,000	322	549	364	1,425
298	3,086	785	1,050	72	1,267	661	842	1,169	349	649	409	1,541
258	3,396	693	991	92	1,117	564	804	1,090	323	750	410	1,383
159	2,298	710	1,116	67	1,244	646	793	1,148	380	762	388	1,279
193	2,068	748	1,076	70	1,428	755	690	981	396	645	402	1,405
208	2,082	726	1,102	75	1,446	727	798	1,016	431	857	377	1,354
125	2,231	602	1,062	79	609	776	821	1,175	334	2,020	409	1,372
180	2,038	752	1,038	86	632	741	953	1,000	434	745	385	1,467
345	2,465	528	959	74	647	402	473	1,010	227	370	530	1,345
327	1,901	591	1,026	63	680	437	540	936	254	373	477	1,196
233	2,192	666	1,064	70	871	442	537	1,125	236	512	375	1,749
266	2,405	675	1,041	87	925	480	612	1,133	257	617	477	1,235
275	2,328	704	1,056	73	985	512	662	1,208	279	572	369	1,301
328	2,406	681	1,040	13	986	534	676	1,167	288	600	432	1,314
383	2,068	621	1,031	71	945	573	626	1,011	295	543	405	1,331
305	2,303	668	1,051	67	1,027	523	741	1,034	357	597	457	1,404
257	2,326	606	1,059	69	1,062	644	802	1,113	294	1,695	508	1,518
249	1,799	597	1,027	92	1,023	617	803	879	387	600	387	1,265
124	2,345	618	1,019	67	1,288	651	749	1,062	390	709	430	1,349
171	1,535	599	1,034	75	1,091	679	736	955	394	576	433	1,271
198	1,985	577	1,047	84	1,244	681	773	995	436	777	379	1,443
142	2,555	509	1,078	81	693	629	831	993	411	683	361	1,568
161	2,089	664	984	80	608	728	865	994	443	733	365	1,491

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
September:												
1888	8,433	3,877	45.9	294	31	279	102	12	114	43	11	142
1889	8,264	3,179	38.4	208	19	247	98	2	53	9	14	90
1890	9,111	3,356	39.0	294	30	234	84	.....	40	29	15	102
1891	9,662	3,984	41.2	247	59	287	83	.....	99	21	13	60
1892	9,610	3,737	38.8	235	48	280	74	9	78	37	16	96
1893	9,346	3,718	39.8	248	29	227	68	23	34	24	11	85
1894	9,525	3,948	41.5	244	28	229	51	9	33	15	11	102
1895	10,011	4,161	41.5	250	52	220	50	.....	26	36	15	119
1896	9,467	3,396	36.0	197	44	221	65	.....	26	31	11	102
1897	9,588	3,432	36.5	188	51	157	34	.....	31	19	12	76
1898	11,481	4,320	37.5	230	47	333	82	.....	26	20	6	120
1899	9,186	3,068	33.4	172	57	205	21	.....	19	34	6	85
1900	10,251	3,760	36.7	220	41	245	41	.....	12	21	16	66
1901	10,269	3,668	35.7	283	25	210	47	11	32	14	14	60
1902	9,682	3,218	32.6	195	30	179	20	6	31	7	15	83
October:												
1888	7,866	2,522	32.0	196	33	288	109	12	125	43	19	102
1889	8,050	2,288	28.4	177	21	261	87	.....	57	7	13	70
1890	8,640	2,665	52.7	155	26	240	87	.....	62	47	6	84
1891	9,718	3,454	35.5	200	47	290	70	.....	118	36	14	54
1892	9,092	2,894	31.8	174	35	205	72	27	96	26	18	78
1893	8,981	2,994	33.4	185	56	253	50	19	65	14	16	56
1894	9,008	2,936	52.5	180	22	234	46	5	32	15	6	72
1895	9,320	2,951	31.5	167	36	265	50	2	36	46	13	95
1896	8,676	2,481	28.2	140	27	195	57	.....	35	37	12	67
1897	9,080	2,055	22.6	138	30	173	44	.....	49	33	15	59
1898	9,632	2,868	30.0	140	37	281	49	.....	38	10	14	59
1899	9,280	3,175	34.2	111	46	202	27	1	36	24	17	60
1900	9,676	2,864	29.6	146	36	283	37	.....	24	24	13	54
1901	9,738	2,627	27.0	150	25	235	40	14	38	20	17	53
1902	9,475	2,537	27.0	132	34	225	18	4	56	17	6	61
November:												
1888	6,987	2,111	30.2	174	21	153	61	8	171	52	16	90
1888	7,285	2,025	27.7	139	21	169	63	.....	56	25	21	55
1890	8,209	2,199	28.5	146	29	216	68	.....	102	74	17	42
1891	8,727	2,528	29.0	151	39	241	61	2	179	31	26	31
1892	8,448	2,540	30.1	167	39	184	50	18	127	51	26	77
1890	8,458	2,324	27.5	157	45	180	30	27	77	56	14	50
1894	8,146	2,254	27.6	151	25	189	30	10	52	75	17	53
1895	8,372	2,287	27.4	134	21	204	43	.....	51	96	18	57
1896	7,888	2,165	27.5	113	26	132	21	.....	48	45	18	44
1897	8,325	2,045	24.5	108	31	151	28	.....	62	63	12	27
1898	8,709	1,970	22.7	90	36	189	30	1	32	18	17	52
1899	8,607	2,187	25.4	101	38	169	25	.....	54	75	26	47
1900	8,715	2,178	25.0	110	38	233	26	1	33	32	12	50
1901	9,309	2,097	22.6	110	26	147	23	9	81	49	6	39
1902	9,010	2,086	23.2	100	15	208	10	20	63	19	10	44
December:												
1888	8,369	2,495	28.8	179	28	138	49	13	278	138	33	113
1889	8,483	2,311	27.0	126	38	117	53	.....	73	33	22	84
1890	8,761	2,635	30.0	135	30	157	59	.....	144	117	36	71
1891	11,241	3,023	26.9	133	32	183	47	.....	246	78	33	41
1892	9,528	2,754	28.9	146	24	147	40	17	195	82	22	82
1893	10,600	2,834	26.7	117	46	158	27	35	106	70	25	73
1894	9,000	2,567	28.5	133	33	139	35	11	82	35	34	53
1895	9,438	2,771	29.5	134	31	169	34	.....	75	172	34	72
1896	9,074	2,378	26.0	112	28	126	30	.....	63	50	20	59
1897	9,100	2,195	25.0	97	28	160	20	.....	91	61	26	43
1898	10,877	2,269	21.0	70	35	156	22	.....	53	38	18	59
1899	9,833	2,441	25.0	93	39	155	18	2	69	88	33	72
1900	9,889	2,310	23.3	105	37	263	16	7	60	81	21	53
1901	10,373	2,579	24.8	104	38	166	24	15	81	126	30	52
1902	10,347	2,447	23.6	97	20	182	5	44	85	39	33	57

FIFTEEN YEARS — (*Concluded*)

Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1,440	649	895	69	600	343	494	895	198	303	510	995
1,094	646	946	65	638	794	483	870	206	326	446	872
1,196	710	1,027	47	768	418	520	871	236	375	450	1,712
1,434	720	1,039	65	924	479	596	997	289	449	421	1,293
1,266	834	1,010	69	877	502	629	898	280	459	461	1,208
1,395	713	942	68	863	528	597	1,026	268	443	391	1,221
1,454	668	988	54	852	492	612	970	268	488	399	1,413
1,672	675	1,009	65	923	577	703	988	277	522	452	1,308
1,077	826	1,023	57	848	556	810	905	306	543	417	1,305
1,171	785	998	70	949	602	825	933	327	651	421	1,217
1,872	768	1,076	70	1,162	647	856	1,116	378	917	478	1,362
972	755	947	50	1,065	646	729	937	366	537	327	1,247
1,656	645	980	72	1,143	727	705	905	405	605	420	1,392
1,808	582	1,021	58	673	705	815	958	417	577	402	1,657
1,390	835	917	80	622	686	899	905	314	589	512	1,305
386	1,031	1,034	70	518	392	495	781	232	278	512	984
339	959	1,016	64	557	431	595	899	238	343	491	1,032
360	1,001	1,061	71	635	485	597	884	238	366	470	1,538
794	1,012	1,124	60	832	558	695	1,023	259	430	494	1,281
491	1,132	996	62	709	547	694	1,024	263	448	420	1,198
533	947	1,070	58	771	542	658	1,010	273	422	363	1,206
635	901	1,013	54	757	540	690	959	298	452	477	1,249
554	749	1,112	67	761	630	767	840	319	511	445	1,564
338	1,123	990	70	689	605	908	815	323	455	437	1,132
447	1,090	1,070	79	717	608	820	911	353	568	437	1,205
687	1,044	1,052	65	943	673	848	1,015	376	526	448	1,292
361	1,163	1,064	57	832	753	810	1,017	394	550	417	1,195
712	967	1,078	62	955	760	830	934	376	540	429	1,334
733	916	1,112	59	659	792	922	991	424	527	425	1,475
613	985	1,027	61	610	777	1,040	1,039	416	571	406	1,294
112	1,051	893	58	414	398	522	796	164	300	443	726
110	1,133	944	67	450	452	599	822	199	311	419	868
124	1,007	1,019	74	518	435	554	851	208	387	409	1,388
143	1,507	1,017	65	583	501	656	967	237	404	437	1,033
137	1,445	940	55	582	490	674	845	244	377	382	1,008
152	1,242	957	57	595	529	691	925	242	411	469	1,009
146	1,130	1,020	48	566	575	661	880	262	383	392	991
150	1,348	979	71	583	584	750	798	263	473	370	1,027
132	1,184	876	66	524	599	828	772	330	443	355	1,017
191	1,153	977	78	605	607	867	841	308	432	408	1,075
165	1,288	1,049	54	625	681	918	998	380	450	451	1,027
132	1,274	1,027	61	642	709	882	916	370	457	412	1,014
231	1,172	1,011	66	644	758	764	955	390	412	401	1,132
300	1,203	1,063	74	537	841	1,002	1,000	410	478	364	1,326
254	1,327	951	61	541	689	997	1,043	419	625	374	1,092
87	1,392	1,017	95	434	461	584	917	232	345	577	817
110	1,635	1,127	83	463	466	656	950	218	288	455	1,046
80	1,756	1,045	85	533	488	643	1,000	257	285	454	1,029
115	2,731	1,090	100	616	593	801	1,183	296	416	732	1,153
113	1,737	1,145	78	575	572	779	1,132	259	404	416	1,026
123	2,445	1,099	80	581	610	792	1,078	254	359	724	1,237
103	1,155	1,117	58	551	628	719	1,033	269	284	401	1,088
115	1,741	1,054	79	596	609	931	866	306	510	399	1,083
127	1,454	1,052	66	604	673	899	927	300	495	443	1,098
121	1,541	1,056	61	610	679	952	981	344	427	501	1,118
141	2,250	1,185	71	657	845	1,091	1,177	369	479	562	1,425
112	1,793	1,088	82	648	789	941	1,085	416	451	437	1,184
143	1,587	1,082	78	733	793	970	1,113	412	467	454	1,160
213	1,923	1,050	94	562	835	1,103	1,123	442	491	454	1,210
10	1,624	1,023	82	613	881	1,137	1,165	458	557	465	1,348

The infant mortality.—The deaths under the age of five years constituted 25.3, a little over one-fourth of the total mortality. The actual number of deaths of early life being 31,215, against a yearly average for the past ten years of 37,970, or 31.0 per cent of the total. There has been a nearly constant decrease in the mortality of early life; there were 10,000 fewer deaths under five years of age during this year than in the five years 1892-1896, and a decrease from a proportion of one-third of the deaths to almost one-fourth. The infant mortality this year was unusually low, fewer deaths occurring under the age of five years than in any previous year.

The sanitary districts have infant death rates corresponding to the density of population. This is exhibited in one of the tables given.

The mortality of *advanced age* is on the contrary greatest in the rural districts, by far. In the maritime district the age of decedents at 70 years of age and over is seldom above 10.0 per cent of the total, whilst in the rural districts about one-third of them for the year occur at that period of life. For the entire state 17.0 per cent of the deaths occur at or over 70 years of age. This year about 35.0 per cent of the deaths of the maritime district occurred under the age of five years and 10.0 per cent above 70; in the West central district more than 35.0 per cent occurred above 70 years of age and only 13.3 per cent under five years of age, almost reversing the relative mortalities of these two periods of life.

The zymotic mortality.— Under this term have been recorded the deaths from the ten common infections or preventable diseases that are met with in this climate. These caused 14.0 per cent of the deaths of the year. The districts with large urban population had the biggest relative mortality for these causes; in the Maritime and the Lake Ontario and Western districts they composed respectively 17.0 and 12.5 per cent of all the deaths, whilst in the rest of the state they were from 7.0 to 10.0 per cent.

The average zymotic mortality for the past ten years was 15.0 per cent, whilst the total number of deaths from all causes was 1,000 more than the ten year average. There were 1,700 fewer deaths from the 10 common zymotic diseases.

Diarrheal diseases.— One-half of the zymotic deaths were from acute diarrheal diseases. The mortality varied little from the average of the past ten years. During that time the number of deaths due to this cause has generally been over 8,000; in 1899 it fell to 6,500, in 1901 it was 9,337. Half of the entire mortality occurs in July and August, whilst September follows closely; the diarrheal mortality of July is mostly urban; that of the rural part of the state comes later in August and September.

In each 1000 deaths there were from acute diarrhea in the—

DISTRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902
Maritime	80	80	71	70	74	55	56	93	85
Hudson valley	66	63	72	51	60	52	68	40	42
Adirondack and Northern	57	53	53	45	60	50	72	41	33
Mohawk valley	65	55	60	43	65	42	65	41	44
Southern tier	58	50	50	39	60	38	55	30	34
East central	64	56	62	38	54	34	68	31	33
West central	40	45	53	31	52	34	57	28	25
Lake Ontario and Western	104	100	93	76	90	70	86	60	56
Entire state	76	75	73	63	70	53	62	72	67

The following was contributed to the *Monthly Bulletin* by Dr. H. L. K. Shaw, of Albany:

Prophylaxis and treatment of summer diarrhea.— The exceptionally high mortality among infants during the summer months is a fact not requiring emphasis. The heat and humidity of summer predisposes to disorders of the alimentary system, giving rise to the descriptive though unscientific term of summer diarrheas. The chief cause of these diarrheas is microbic, and the atmospheric conditions during the summer months are especially favorable to bacterial growth in food and drink. To exclude the germs or to prevent their propagation is the most important step in the prophylaxis. Other factors enter into this problem and must be considered, as they tend to lower the resistive vitality of the child, such as direct exposure to the sun, high humidity, overcrowded dwellings, excessive clothing, etc. "Teething" should not be made an excuse for neglecting any attack of diarrhea, for dentition, contrary to the common idea, is a physiological process and does not in itself cause diarrhea.

Summer diarrhea occurs almost exclusively among artificially fed babies. Health Boards and Medical Societies in the larger cities throughout the country are endeavoring to obtain a purer milk supply in their localities, and are striving to educate not only the dairymen, but also the public, to a knowledge of the barn and cow hygiene necessary for the production of sanitary milk, i. e., milk containing few bacteria. It is absolutely essential that bottle fed babies should receive pure, fresh and germ free milk. The number of bacteria gives us definite proof of the cleanliness of the cows, milkmen and barn and the subsequent care of the milk. The Milk Commission of the Medical Society of the County of New York place thirty thousand bacteria per cubic centimeter as the maximum for certified milk. In Albany twenty examinations from the best dairies showed a minimum count of eighty-eight thousand, and the highest number was over two million and a half to a cubic centimeter. Comment is unnecessary.

Milk, especially in the intestinal canal, forms an excellent culture medium for the growth of bacteria; it also forms tough curds which irritate the intestinal mucous membrane. For these reasons the milk must be stopped at once; this is the first and most important procedure in treating any attack of infantile diarrhea, and should be done when the slightest looseness of the stools occur. At this time milk feeds the bacteria and not the child. No return to the milk diet should be allowed until the stools resume a natural appearance. Cereal gruels, weak meat broths, etc., can replace the milk for several days. On all very hot days it is always a wise plan to reduce the strength of the milk fed to babies, and when the humidity is oppressive to stop it entirely and substitute a weak decoction of barley water.

The next indication is to cleanse the gastro-intestinal tract and to rid it of the irritant material which forms so favorable a soil for the growth of pathogenic bacteria. Castor oil and calomel are the most satisfactory drugs we can employ. When there is much mucus and an offensive odor to the stools, colon irrigation is of great service. The technique of this operation is very simple. A medium sized soft rubber catheter is attached to an ordinary fountain syringe. The bag is filled with normal salt cold if fever is present, and elevated three feet above the The infant should lie on the left side with the leg drawn the catheter inserted slowly to its full length with the owing; this tends to distend the colon and reduce the ty of the catheter doubling on itself.

success has ever been attained by the use of the various nts and intestinal antiseptics. Antisepsis in the inteimpossible. Asepsis can be approximately obtained by and removing the bacteria. Subnitrate of bismuth in id oft-repeated doses is sometimes beneficial. Opium e avoided and is of service only where there is severe s (straining and colic) with frequent movements.

rt the successful treatment of summer diarrhea lies in ion and limitation in the diet. To pay special attention ylaxis and to regard no attack of diarrhea as trivial will solve the problem of decreasing the mortality of summer

heria.— Next numerically of the zymotic causes of death heria and croup, causing this year 2,859 deaths or 17.0 t, less than one-fifth of the entire deaths of the group. rage mortality for diphtheria for the preceding 10 years 9; but of the series, the last five years has had a very much death rate than that of the five preceding years. There fact an abrupt fall in 1898 to 2,612 deaths from 4,115 in r before, and the deaths noted for this current year are early what they are for the average of the five years, and re than half of the average of the five years before.

each 1000 deaths there were from diphtheria in the—

TRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902
....	71	52	45	43	21	28	32	28	28
ey...........	31	28	26	28	18	19	21	20	16
and Northern	28	18	27	25	11	10	14	17	9
lley....	28	11	15	20	15	19	20	22	20
er.............	39	21	15	17	13	13	20	13	21
l.............	30	13	20	22	16	9	10	11	8
u.............	17	14	10	14	6	12	15	6	8
io and Western.	40	39	40	34	16	16	16	18	17
state..........	56	41	38	35	22	23	25	23	23

The following rules regarding the securing of diphtheria antitoxin and its use, prepared by the Director of the Antitoxin Laboratory, Dr. H. D. Pease, was printed in an issue of the *Monthly Bulletin:*

The State Department of Health desires to announce that it is now prepared to furnish diphtheria antitoxin, prepared and tested in its antitoxin laboratory, under the following regulations. It is to be supplied for the treatment or immunization of the following persons:

Inmates of state institutions.

Inmates of other charitable institutions located in New York state.

Persons residing in this state unable to purchase the remedy.

Antitoxin prepared and distributed by this Department is not to be sold under any circumstances. Violation of the above prescribed rules will subject the violator to the penalty provided by section 397 of the Penal Code.

Physicians obtaining antitoxin for use as above noted, must agree to report the results from its use on the proper blank.

Those entitled to receive the remedy under the above schedule should apply as follows:

State institutions, to the State Department of Health, Albany.

All others, to the health officer of the city, town or village where they are located or reside.

Health officers will be supplied with application blanks, and a set of rules governing the distribution.

Health officers of the large cities and towns whose regular reports to the Department indicate more or less constant presence of diphtheria, and such officers in any locality during epidemics, will be permitted, subject to the discretion of the Department, to keep on hand a moderate stock of antitoxin. Others will be supplied as cases arise.

Application by telegraph and telephone from health officers will receive prompt attention.

The serum is to be distributed in two vials containing 1500 and 2500 units of antitoxin in volumes of about 5 to 10 cubic centimeters respectively.

The actual volume of serum in the vials may be reduced from time to time, without any decrease in the number of units of antitoxin.

The vials will always be labeled in such a manner as to clearly show the number of antitoxin units contained in the full volume of serum present.

The Department desires to make the following recommendations concerning the amount of antitoxin which should be used in cases of diphtheria, and for immunization.

Dose for treatment.— The dose recommended varies with the severity of the case, and especially with the day of the disease on which the antitoxin is first administered. The earlier the remedy is used, the more favorable are the results obtained.

In mild cases where the serum is administered within 24 hours of the onset of the disease, the initial dose should not be less than 1500 units, and should be repeated every eight hours until most marked and decided improvement results.

In severe cases where the serum is administered within 36 hours of the onset of the disease 2500 or 3000 units should be the dose employed, and repeated in the same manner.

In the very severe cases, especially in croup, and when the treatment is not begun until after 36 hours of the onset of the disease, the dose should be from 3000 to 5000 units. In these cases, as in the others, the injections should be repeated every eight hours, until there is not the slightest doubt of a complete convalescence.

The above recommendations apply to children and adults alike. The Department desires to impress upon the users of its antitoxin the necessity of using sufficiently large doses early in the disease. There is no danger of giving too much, but of giving too little, and the greatest danger is in delay and procrastination. To suspect a case of being diphtheria is a sufficient warrant for the prompt injection of antitoxin.

Dose for immunization.— Three to five hundred units of antitoxin should be injected into any child or adult who has been exposed to diphtheria. Such individual will then be protected from the disease with almost absolute certainty for a period of from three to four weeks.

If the persons continue to be exposed to the disease, the above dose should be repeated at the end of three weeks. The Department desires to most strongly recommend the use of antitoxin as a means of preventing the development of diphtheria. Not only has such use of it been demonstrated to be an almost positive means of prevention, but in the very few cases where it has failed the course of the disease has been favorably modified.

The Department desires to remind the physicians in localities in the state who are not provided by the local authorities with bacteriological diagnosis of cultures from cases suspected of being diphtheria, that it is prepared to forward culture tubes, and make such examinations through the local health officers to whom applications for culture outfits should be made.

Typhoid fever — There was a low mortality from this cause, 1318 deaths against an average of 1635. A saving of 300 deaths indicates a large saving in the number of the sick. The Maritime district, which relatively to other deaths has fewer from typhoid fever than any other disease of the state, has this year an increase above that of any preceding year.

In each 1000 deaths there were from typhoid fever in the—

DISTRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902
Maritime	8	8	8	8	10	8	10	10	11
Hudson valley	22	33	35	21	28	26	28	20	23
Adirondack and Northern	22	25	26	18	23	26	26	17	20
Mohawk valley	21	20	13	17	22	13	23	17	14
Southern tier	26	26	32	14	20	20	24	18	17
East central	22	20	18	12	21	19	20	18	13
West central	16	10	13	10	10	11	20	13	11
Lake Ontario and Western	25	20	16	16	21	17	17	20	20
Entire state	13	14	13	12	15	13	17	13	14

Scarlet fever.— There were 1215 deaths from this disease. Last year there were 1430 deaths; for six years prior to that the mortality yearly was half that number, but for the earlier years preceding there were from 1200 to 2400 deaths each year for scarlet fever. The average mortality yearly for the eighteen years of records for the state has been 1300 deaths. The change to the higher rate prevailing from the low rate of the years 1895-1900 was abrupt. Of the 1215 deaths this year 968 occurred in the Maritime district.

'n each 1000 deaths there were from scarlet fever in the—

DISTRICTS	1896	1897	1898	1899	1900	1901	1902
itime	8	9	10	8	6	15	13
son valley	3	1	2	2	4	7	5
ondack and Northern	6	1	1	4	4	6	6
awk valley	5	2	2	2	3	4	13
hern tier	2	2	3	5	5	3	5
, central	9	3	4	3	3	5	2
t central	5	2	2	5	3	2	1
e Ontario and Western	4	4	3	5	5	4	4
Entire state	6	7	7	6	5	11	11

Ieasles — There was a mortality of 929 from this disease,
ut the same as of the year preceding. The number of deaths
m measles varies in periods of two and three years. In the
r periods there were between 800 and 900 deaths; in the high
iods 1200 to 1400 deaths, the average being between 900 and
)0. The Maritime district is credited with 737 of the deaths
this year.

In each 1000 deaths there were from measles in the—

DISTRICTS	1900	1901	1902
itime	11	6	10
son valley	10	5	2
ondack and Northern	9	15	5
awk valley	11	8	3
hern tier	6	5	5
central	8	13	2
t central	5	6	2
e Ontario and Western	10	5	7
Entire state	10	6	8

Vhooping cough, which like measles has its periods of preva-
ce and periods of decrease, has this year 923 deaths to its
ount, the average being about 1000. Of the mortality for the
ire state, 661 or about two-thirds occurred in the Maritime
trict, the number of deaths there being double that of last year
m this cause. It was likewise higher in the Hudson valley
trict, the rest of the state showing a material decrease. As is
formly true in this state the largest mortality occurred in
y and August.

Cerebro-spinal meningitis causes on an average about 600 deaths yearly, this year 456. There has been a moderate lowering in its yearly mortality as reported for the last four years. A little more than one-half of the deaths occurred in the Maritime district. It is long since any epidemic prevalence has been discovered, but there are localities where it apparently has endemic prevalence although causing few deaths.

Malarial diseases are credited with but 189 deaths during the year. The average of past years has been about 400. The reported prevalence and mortality from this cause is clearly decreasing year by year. In no year has there been so few deaths ascribed to malarial diseases as in this one.

Smallpox — There were 442 deaths from this cause in 1902, almost the same number as in 1901, during these two years smallpox having the largest death rate of any year on the records of this state.

During the early months of the year smallpox prevailed throughout the Adirondack region, brought in repeatedly by Canadian laborers to the lumber camps. It was not altogether limited to these camps, but spread from them to numerous settled localities. Inspectors from the State Department of Health were constantly employed in this field to control it.

Likewise in the early part of the year it was epidemic in Buffalo having begun during the preceding fall and continuing through the following spring.

In New York city there was an extensive prevalence from January to July, since then having materially abated, few cases now occurring. Of the 442 deaths, 322 occurred in the Maritime district, chiefly in the city, although it spread from there to numerous nearby localities in Westchester county and on Long Island.

There was a considerable prevalence in Albany early in the year; and likewise in Cohoes where it originated among mill workers from Canadian importation. In Schenectady and Binghamton there have likewise been local epidemics.

In Rochester smallpox was extensively prevalent from June and increasing later in the year, reaching its height in December.

In towns along the border, in Chautauqua and Cattaraugus counties, the disease spread from Pennsylvania in the spring and has continued throughout the year in numerous towns, mostly rural. Being exceedingly mild, the people have been indifferent to it and doubtless many cases have occurred in which physicians were not called. Largely in retired localities the number of cases has not been as great as otherwise there would have been, but it has from time to time been transported from one town to another by some traced intercommunication, discovery in one place first bringing to light the existence of an undiscovered originating case. The most faithful care of the local and state health authorities has not brought to an end this epidemic at the close of the year.

A similar condition has prevailed in Walton and other towns in Delaware county, where it was introduced by a minstrel troup in May. Occasional cases have continued to occur from time to time.

Smallpox has occurred during the year in 135 municipalities, the chief of which have been mentioned, in number from a single imported case to considerable and prolonged outbreaks. It was most prevalent in the first half of the year and is not widely prevalent at the close of the year. In the Adirondack region there is no indication of any extensive repetition of the experience of last winter. Only 14 of the 442 deaths occurred outside the larger cities and all but 56 occurred in New York city and Rochester. Most if not all of these deaths occurred to persons unprotected by vaccination.

The following is from an issue of the *Monthly Bulletin:*

As to vaccination -- There are three things to do to control the spread of smallpox: *isolate, vaccinate, disinfect.* Of these the most important is to vaccinate. Under the good vaccination law of this state which requires that unvaccinated children be excluded from the public schools a great amount of vaccinating has been done. And the existence of smallpox in many localities during the last four years has resulted in many more being thus protected from it, for in the presence of danger the public became alive to its importance. The chief obstacle to its being universal is indifference and lack of appreciation of its importance; this is offset generally when proximity of smallpox arouses people to the risk of neglecting it. There are few who oppose vaccination at the present time. In the medical profession there is practically universal belief in it. A circular sent out by the health officer of Albany to the physicians of the city asking for its endorsement received a nearly unanimous signature. There are a few who give various reasons for opposing vaccination, the chief of these that it is unnecessary because it does not protect; and that it is the means of introducing various diseases into the body of the person vaccinated. A vast amount of unanswerable proof has been published of the protective value of vaccination, from the experience of a whole nation to that of an individual. The latter comes nearest home. The writer has for many years been in the way of encountering smallpox personally, and has had no protection except that given by vaccination. He is familiar with like exposures to the disease by very many health officers throughout the state who have invariably had similar experience. Under his recent observation of forty children in an orphanage all but one, who was vaccinated, took smallpox from a case brought in, and likewise the adults, two of whom had not been vaccinated, while the rest vaccinated in childhood escaped. In the extensive work this last winter in the North Woods lumber camps the same fact has been constantly verified under our observation, and the same has been the universal observation in the many outbreaks we have had the oversight of since the spring of 1898 all through the state. It is with utmost confidence then that this Department endorses the statement that no person recently vaccinated successfully, except it be done too late after exposure to the disease, will take smallpox. In saying this we are only confirming by our personal observation the universal testimony of all health authorities everywhere. The medical profession generally believe this to be true and it is asked that they create a public sentiment in favor of its necessity, since compulsory vaccination, except in case of urgent necessity as an extreme measure by boards of health, is not established in this state.

As to the dangers of vaccination, which is a very reasonable question to raise, it can without question be said that none exists if virus free from any taint is used, with reasonable care in using it, and in keeping the abrasion and the resulting sore free from the introduction of external infection. Pure bovine virus can be obtained easily, for the merest self-interest prompts all reputable purveyors of it to be to the last degree scrupulous, and such virus cannot cause any disease but the mild one of vaccinia which it is its purpose to cause. Untoward results, seldom grave however, have followed carelessness in use. The arm, the only proper place to vaccinate, should be made perfectly clean and only a perfectly clean instrument used, either a needle sterilized by heat or, better, the sharp ivory point that is charged with the virus. If the abrasion is then covered with perfectly clean substance so as to protect it from clothing or from handling of soiled fingers there is no risk of any ill result. The latter is the chief source of evil. Among the great number of death returns that come for filing to this Department there have been 4 or 5 which have been attributed to vaccination; these have been inquired into and traced with considerable certainty to the needless infection of the vaccine sore with filth. It is somewhat extraordinary under all the conditions attending many of the hundreds of thousands of vaccinations that so few ills result, for the merest scratch has been known sometimes to be followed by pyæmia and erysipelas. Proper cleanliness will prevent practically all ill results.

How long will a vaccination protect? In a great many cases we have found that infancy vaccination has protected adults. Of 740 cases of smallpox that have been reported to us, 552 had never been vaccinated, 188 had been vaccinated, most of them in childhood, a few within two years, whether successfully not being always stated. The majority are protected by vaccination in infancy and again in early youth. But as it is never possible to know how soon one's immunity is lost, in an epidemic those who have not been vaccinated within five or six years should have it repeated and those directly exposed who have not been satisfactorily vaccinated within a year; in rare cases immunity has been lost in six months.

One case of smallpox occurring the second time in one individual has been reported recently. Vaccination will protect as completely as the disease itself; *nothing else will.*

Consumption — There were 12,582 deaths from consumption in 1902, which is a little over 10.0 per cent of the entire mortality for the year, or 170 deaths for 100,000 population. The average mortality for the previous decade was 13,234, and there has in that time been little variation from the yearly mortality.

In each 1000 deaths there were from consumption in the—

DISTRICTS	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
Maritime	106	110	112	110	106	115	135	114	115	110
Hudson valley	102	111	107	115	112	115	110	110	113	107
Adirondack and Northern	105	115	114	116	108	112	99	100	110	105
Mohawk valley	100	111	113	104	95	106	91	90	93	85
Southern tier	80	81	86	86	75	75	83	76	75	75
East central	98	108	98	93	96	90	85	90	96	90
West central	105	118	100	90	90	90	87	84	80	77
Lake Ontario and Western	92	103	105	101	95	100	93	92	90	85
Entire state	106	108	109	110	108	108	110	110	105	102

The distribution of the disease by its relative mortality exhibited in this table shows that the largely urban Maritime district always exceeds the rest of the state. The excessive mortality of the Adirondack district is chiefly due to imported cases. The lowest mortality in the state is always in the Southern tier district. Even the monthly records show this. The deaths from consumption are very uniform. They are more numerous in the winter and spring months of the year, and the only disturbing element in their uniformity is influenza, during an epidemic of which the mortality from consumption is always increased.

Epidemic influenza (*grippe*) — No specified report of the mortality from this disease is made in the MONTHLY BULLETIN, because the certified causes of death do not admit of it; the increase in the death rate attending an epidemic recurrence of it is far in excess of its reported mortality. It shows in the abnormally increased numbers of deaths from acute respiratory diseases; to some extent in the hastened mortality from consumption which during its prevalence is exaggerated; in the deaths from other local diseases, chiefly of the nervous systems. A record therefore of the deaths reported simply from grippe, or even of these also in which it is reported as contributory, would not represent the legitimate mortality which is properly attributable to it. It is only possible to estimate the probable mortality of this disease by the deviation from the normal of the mortality which attends its annual recurrence.

A history of the outbreaks of epidemic influenza which have been of annual recurrence since December, 1889, has been given in the last report. Usually they have commenced in December; they more generally increased gradually in intensity and have reached their height in a following month, five times in January, twice in February, four times in March and twice in April. The length of time during which their influence has been felt has been from three to six months. Their addition to the mortality has been estimated at from 2500 to 8000, in 1900 reaching 10,000. What proportion of the population has been affected by it has certainly varied with the intensity of an epidemic and in any case can only be conjectured, but it has been estimated that in severe outbreaks hardly more than 50 per cent escaped; assuming which, about 1 in 400 of the cases was directly or indirectly fatal. It has doubtless been the case that in certain localities the population have been more generally affected and the disease has been more virulent, but it is not apparently the case that the disease has been specially one of either the city or the country. It has shown different types in different epidemics and in different places. It has unquestionably been communicable and so doubtless its spread would be to some degree controlled by isolation. A previous attack does not confer immunity, as with some infectious diseases, but rather, apparently, predisposition. The onset of an epidemic so far as we have record has been general, commencing at all points for the most part simultaneously. It is a disease of the cold months of the year, in which it is at one with acute diseases of the respiratory organs.

The 13th epidemic of grippe, of 1902, began in December of the preceding year; in that month it caused a mortality estimated at 750; in January and February, each, 1500; in March 750; in April 400; and in May 100, making a total of 5000 deaths during the six months in which it appeared to enter as a factor of mortality.

Its reappearance at the close of this year has been insignificant, although reported, and it has been estimated to have caused 500 deaths in November and December.

This table shows a series of influenza epidemics:

Time of occurrence	Height reached	Duration	Number of deaths
1890	January, 1890	3 months	5,000
1891	April, 1891	6 months	8,000
1891–2	January, 1892	5 months	8,000
1893	April, 1893	6 months	6,000
1893–4	January, 1894	4 months	3,000
1895	February, 1895	4 months	5,000
1896	March, 1896	5 months	2,750
1897	March, 1897	4 months	3,000
1898	March, 1898	6 months	2,500
1898–9	January, 1899	5 months	7,000
1900	March, 1900	6 months	11,500
1901	January, 1901	5 months	7,000
1902	February, 1902	6 months	5,000

Acute respiratory diseases — Under this head are included the deaths from acute inflammatory diseases of the respiratory organs; pneumonia, broncho-pneumonia, bronchitis, acute pulmonary abscess, pleurisy chiefly.

Of the entire number there were 16,986 deaths, against a yearly average of 17,500 during the past ten years. In 1891 and 1892 there were more than 20,000 deaths from these causes, the largest mortality of our records, but nearly reached in 1900, during all of which years there were violent epidemics of grippe. Prior to the grippe epidemics, that is prior to 1890, the yearly mortality from acute respiratory diseases was 13,500; since then it has not been below 16,000. Of the deaths this year 8800 were from pneumonia, so far as reported, not including broncho-pneumonia. New York city reported about 6000 deaths from pneumonia during the year.

Percentage of acute respiratory to total mortality in the—

DISTRICTS	1897	1898	1899	1900	1901	1902
Maritime....................	14.5	15.0	16.0	17.4	14.5	16.0
Hudson valley....................	15.0	12.5	13.0	13.0	13.0	11.7
Adirondack and Northern..........	12.8	11.0	13.1	11.3	12.5	9.2
Mohawk valley....................	13.5	10.0	13.5	11.5	13.7	10.5
Southern tier....................	12.0	10.0	11.7	11.0	12.0	10.0
East central....................	12.3	11.0	13.0	10.0	11.2	9.5
West central....................	11.7	10.0	12.5	9.4	11.5	9.5
Lake Ontario and Western.........	13.0	12.1	13.5	11.5	12.5	10.5
Entire state....................	14.0	13.5	14.7	15.0	13.5	13.8

Cancer — The mortality from cancer was 43 less than in 1901. This is the first time in the eighteen years of records of the State Department of Health that there has failed to be an increase in the number of deaths from this cause over the year preceding. From about 2000 deaths there has been an increase yearly of about 200 deaths till it has reached now about 5000 deaths in the year. In that time the total yearly mortality has increased from 85,000 to 125,000, but with no regularity, since in some years the mortality has been less than the year preceding.

The distribution of cancer in the sanitary districts of the state and its relative prevalence in them is shown by the following tables. The central, especially the east central, and western part of the state have the largest mortality.

Reported mortality from cancer in the sanitary districts for 8 years--

DISTRICTS	1895	1896	1897	1898	1899	1900	1901	1902
Maritime	1,805	1,894	2,031	2,174	2,302	2,449	2,651	2,557
Hudson valley	356	404	425	419	415	476	459	497
Adirondack and Northern	173	192	213	212	212	234	208	220
Mohawk valley	207	189	242	264	255	295	267	282
Southern tier	182	217	260	253	280	287	261	259
East central	255	258	268	305	310	329	295	304
West central	162	177	199	218	213	232	227	246
Lake Ontario and Western	414	459	495	530	548	569	665	624
Entire state	3,554	3,789	4,131	4,385	4,533	4,871	5,033	4,990

Following the estimated population of the *Monthly Bulletin*, there were in the sanitary districts:

Deaths from cancer per 100,000 population—

DISTRICTS	1898	1899	1900	1901	1902
Maritime	58	57	62	66	65
Hudson valley	60	56	68	67	72
Adirondack and Northern	54	54	60	53	58
Mohawk valley	67	65	74	65	67
Southern tier	60	64	65	63	60
East central	74	74	79	74	76
West central	70	65	71	71	78
Lake Ontario and Western	61	61	65	75	71

The following, by the Director of the Antitoxin Laboratory, Dr. H. D. Pease, is from an issue of the *Monthly Bulletin:*

Tetanus antitoxin — The State Department of Health now furnishes tetanus antitoxin, prepared and tested in its antitoxin laboratory, under the following regulations:

It is to be supplied for the treatment of immunization of any of the following persons:

Inmates of state institutions.

Inmates of other charitable institutions located in New York state.

Persons residing in this state unable to purchase or obtain the remedy.

Antitoxin prepared and distributed by this Department is not to be sold under any circumstances.

Physicians obtaining antitoxin for use as above noted, must agree to report the results from its use on the proper blank.

Those entitled to receive the remedy under the above schedule should apply as follows:

State institutions to the State Department of Health, Albany.

All others to the health officer of the city, town or village where they are located or reside.

The serum will be distributed in two forms. A small vial containing twenty-five cubic centimeters, or less, will be sent out for use as a preventive or immunizing agent. Larger bottles containing from fifty to several hundred cubic centimeters, intended for the treatment of cases of tetanus, will be forwarded upon application by letter, telegraph or telephone to the Antitoxin Laboratory, State Department of Health, Albany.

While the results obtained from the use of antitoxin in tetanus have not been as favorable as was at first expected, a study of the reported cases and statistical reviews clearly indicates that the death rate has been lower in those cases where it has been used. How much has been accomplished is hard to estimate correctly. In many reported recoveries attributed to the use of antitoxin the diagnosis has been without doubt erroneous. There is unquestionably a natural tendency to report recoveries, but to say nothing about the failures.

We are at present in the position where the remedy should be used in every case where it can possibly be obtained, and it is the intention of the State Department to make such use possible. As soon as it can possibly do so a supply of both diphtheria and tetanus antitoxins, sufficient for beginning the treatment of at least one case of each disease, will be placed in the hands of every health officer in the state for use when needed. This will permit an early start in the treatment of a case, and allow sufficient time for a further supply to be sent for and received.

Tetanus antitoxin must be administered early. By the time the tetanic symptoms have developed, the disease is already well advanced. The affinity of tetanus toxin for the elements of the nervous system, chiefly those of the anterior roots of the spinal cord, is a strong one. The union of the toxin with the nerve cells is difficult to break up with antitoxin, if indeed it can be accomplished. The object to be aimed at in the treatment is, therefore, the neutralization of such toxin as may not have united with the nerve elements, but is still either in the general circulation or the cerebro-spinal fluid. The path taken by the toxin from the wound to the nerve elements is not yet definitely known, but the rate at which it travels this path is known to be proportional in most cases to the amount of toxin being generated. In other words, the shorter the period of incubation and the quicker the onset of the general spasms, the more serious the case. In experimental tetanus in laboratory animals, the larger the dose of the toxic filtrate from tetanus cultures, the quicker the onset of the disease and the shorter the course. In cases where doses not sufficient to kill are given the onset of the tetanic symptoms may be greatly delayed. It can be readily seen that the more serious the case, the more urgent is the need for the earliest possible administration of the antitoxin.

In order therefore to save the time necessary for the absorption of the serum from the subcutaneous tissues, and in order that the serum may reach the free toxin in as concentrated a state as possible, the best methods of administration would seem to be by intravenous infusion, and by injections made either into the frontal lobes or lateral ventricles of the brain, or subdurally by means of a lumbar puncture.

The intracerebral method was devised by Roux and Borrel, and is the method successfully used by Kocher. The subdural method was devised by Blumenthal and Jacob, and has been used with considerable success by Von Leyden.

The favorable outcome in the very severe case treated by Mixter with intravenous infusion of over three litres of tetanus antitoxin shows what can be accomplished by the vigorous use of this method. The largest single dose which was given in that case was four hundred and eighty cubic centimeters, or about a pint.

Certain precautions are necessary with the use of all of these special methods. With the intravenous infusion of large amounts the serum should be heated to 1° F, above the rectal temperature to prevent collapse. A higher temperature should be avoided as tending to raise the body temperature. With the intracerebral method the serum must be injected with the greatest care. Strict asepsis and extreme slowness in injection are imperative. Repeated injection in the same areas are to be avoided as tending to sepsis. Amounts up to five cubic centimeters have been given by this method without gross local injury. In using the spinal subdural injections Von Leyden withdraws ten cubic centimeters of cerebro-spinal fluid and injects five cubic centimetres of antitoxic serum, and repeats this dose two days later.

The use of antitoxin is but an important part of the treatment of a case of tetanus. The disease makes the greatest demand upon the skill and resources of the physician and surgeon.

Of the physiological remedies which have been used and recommended the following may be mentioned: Chloral and bromides in full doses are most frequently used. Antimony, hyocyamus, paraldehyde and physostigmine are also commonly administered. No one of the above should be used exclusively or continuously, but a careful changing off should be carried on to avoid creating a toleration for any one drug. Morphine, to produce sleep and relieve the pain, combined with antimony in doses of an eighth to a sixth of each every two hours, is strongly recommended by Lambert, as is also amyl nitrite placed on the nasal mucous membrane to relieve sudden spasms of the glottis and respiratory muscles. In Mixter's case referred to above anaesthetics were employed to control the spasms with good effect, and he recommended ether especially. They should be used with great care.

Baccelli's treatment by the subcutaneous injection of a carbolic acid solution has been used in many cases as an adjunct to the antitoxin. A one or two per cent aqueous solution of the drug is given every two or three hours in such doses as to make the total amount about three grains in the first twenty-four hours, and then rapidly increased until from two to three times that amount is injected during the twenty-four hours. Smokiness of the urine indicates a poisonous effect from the drug. Large amounts are said to be well born in tetanus.

To make use of the most ideal and scientific method of handling tetanus is to prevent it by subcutaneous injections of immunizing doses of tetanus antitoxin in all cases of suspicious or contaminated wounds. In cases where garden dirt, stable dust, manure, paper wads or powder from cartridges have been ground or forced into the injured tissues, a preventive dose of tetanus antitoxin should be given subcutaneously at the time the wound is dressed, or as soon after as is possible. This is especially recommended where cases with injuries of this kind occur in parts of the state in which tetanus has often followed similar wounds in the past.

This summary of the Second Annual Conference of Sanitary Officers is from an issue of the *Monthly Bulletin:*

The Conference of Sanitary Officers — The Second Annual Conference of Sanitary Officers which was held in Albany, October 30 and 31, was in every way successful and satisfactory to the State Department of Health under whose direction it was projected, and likewise to all its participants. It was attended by a large number of local sanitary officers who showed their interest by marked attention to all the subjects presented and by their intelligent discussion of them. There was a registered attendance of 200 and every county in the state was represented except Allegany, Cortland, Livingston, Putnam, Schuyler, Sullivan, Tioga, Warren and Yates, and from many of them a considerable number of the towns and villages had representatives, as well as from 23 cities. The occasion was one which brought, fortunately, men from not a few of the rural localities, often from retired places remote from the lines of travel, to whom it was one of valued opportunity; and for all it was a school of instruction in matters of vital interest. Those who addressed them found an eagerly attentive audience before whom it was a pleasure to stand; nothing showed more clearly than this the importance of this conference or determines more certainly its value to health interests in this state, and the permanent establishment of this combined school and forum as an annually recurring event is evidently necessitated. Opportunity is given the department to meet the local health officers personally, who in turn are enabled to secure instruction from those competent to give it and an answer to questions that come to them in their work. To many of them this work is to a degree new for they are largely self-educated sanitarians, for their office must generally be filled by physicians without special training other than that ordinarily secured by the practicing physician. Their interest in preventive medicine is stimulated by these gatherings. The meeting was favored by the presence of the Secretaries of the State Boards of Health of Minnesota and Michigan, Drs. Bracken and Baker, and of Dr. Peter H. Bryce, of the Province of Ontario.

At the opening session Deputy Attorney-General E. D. Warner spoke on the legal aspects of the work of health officers. This office and the work in the interest of public health has a legal existence of recent time, and depends on the statute and its construction by the courts. The various phases of the health officers' relation to the law were extensively discussed; eligibility for the office; vacancy of office, the health officer although to be appointed annually holds over if a successor is not appointed at the expiration of his term of service; as executive officer of the board of health he is not vested with duty other than that given in the orders and regulations of the board, and formal action by the board is requisite in the full enforcement or abatement of a nuisance if contested, and such cases must be referred to the board for further action if the violation is of general orders, although he should be clothed with authority to deal with grave emergencies in considering which a court would give wide discretion; dealing with violations of the board's regulations, which egulations must be published, i. e., given publicity in any approved manner, and of which the person offending must be served with a copy so as to have knowledge, and cited before the board for a hearing, of which meeting every member of the board must be notified, and he must be furnished with a written statement of the conclusions or otherwise have knowledge; no order of a board has extraterritorial effect; a penalty imposed in the board's regulations must be for a definite amount; various questions were discussed as to the powers of boards of health, such as requiring that dogs be muzzled, no law in this state authorizing killing unlicensed dogs unless known to be affected with a dangerous disease; as to constructing sewers when of the nature of important public improvements for which their power is doubtful; as to natural swamp lands for relief of which a special act of legislature is safest for a special case; the enforcement of orders of the board of health, in which the health officer "acts at his peril" and must be careful not to err in judgment although the court will hold a presumption that the action is in good faith — the party being entitled to notice and opportunity for defense before the board; the proper expense of quarantine; the question as to landord and tenant, their responsibility for a nuisance being as to who is in control of the property; what are nuisances; and as to compensation, the health officer not being entitled to more than his fixed salary for duties necessarily embraced by the character of services rendered. This subject attracted much after-discusion and inquiry.

Other papers presented were those of Dr. Peter H. Bryce, who ead a most interesting one on The Ethical Value of Education n Preventive Medicine; of Dr. Herbert D. Pease, Director of the Antitoxin Laboratory of the Department, on Antitoxin as a Therapeutic and Prophylactic in Diphtheria and Tetanus, in which he showed that the diphtheria death rate has been reduced lmost one-half during the seven years of antitoxin treatment; f Dr. Willis G. Tucker, Director of the Bureau of Chemistry of he Department, on The Use and Abuse of Food Preservatives. llustrations by means of lantern slides of smallpox in its various utaneous manifestations were exhibited by Dr. George Henry

Fox, of New York; and the Technique of Vaccination was a subject presented by Dr. F. C. Curtis. Garbage Disposal had able presentation by Rudolph Hering, C. E., on which no one is better qualified to speak, with illustrations of destructors of the type providing for drying and incinerating which was spoken of with favor. These and other papers by Professor Olin H. Landreth, Consulting Engineer for the Department, on The Present Status of Laws for Protection of the Purity of Streams; on Disinfectants by Dr. A. H. Doty, Health Officer of the Port of New York; on The Liberty to be Allowed the Tuberculosis Patient, by Dr. E. R. Baldwin, of Saranac Lake; and on Vital Statistics, with advocacy of the universal adoption of the Bertillon system of classification of causes of death; most of this exciting much interest and discussion can only be mentioned, a detail of the chief points of some of them being reserved for another time. The conference ended with a reception at the Bender Hygienic Laboratory where matters of interest connected with the work done there were exhibited, especially in the manufacture of antitoxin, which is prepared for free distribution to health officers throughout the state.

METEOROLOGICAL DATA FOR 1902

From Records of the National Weather Bureau Stations in the State of New York

STATIONS	BAROMETER			HUMIDITY		TEMPERATURE (Deg. Fahr.)						SKY			PRECIPITATION (Inches)				WIND	
	Mean	Highest	Lowest	Mean Relative (per cent.)	Dew Point (degrees)	Mean	Mean for 30 Years	Highest	Lowest	Greatest Daily Range	Least Daily Range	Number Clear Days	Partly Cloudy	Cloudy	Total	Average 30 Years	Total Excess	Total Deficiency	Prevailing Direction	Total Movement (miles)
1902.																				
January	30.08	30.74	29.36	79	18	25	26	45	3	27	4	4	9	18	2.39	2.99	......	0.80	W.	9.940
February	29.88	30.35	29.10	80	17	24	26	52	3	44	5	5	10	13	3.71	3.76	......	......	W.	9.913
March	29.98	30.45	29.21	74	31	40	32	64	17	26	5	7	8	15	2.93	3.11	......	0.92	W.	9.678
April	29.90	30.31	29.37	69	36	47	45	81	32	34	3	5	13	12	2.51	2.50	0.05	......	W.	9.010
May	30.01	30.40	29.67	67	43	56	57	87	31	32	6	9	12	10	1.94	3.12	......	1.20	S.W.	7.765
June	29.87	30.40	29.38	73	52	63	67	86	45	31	8	5	15	10	4.53	2.24	1.30	......	W.	7.853
July	29.98	30.25	29.72	70	61	71	72	89	54	23	5	8	10	13	4.79	3.65	1.15	......	S.W.	6.461
August	29.96	30.24	29.68	74	57	67	70	88	52	23	9	8	15	8	2.62	3.39	......	0.77	W.	6.250
September	30.04	30.34	29.55	77	54	64	64	84	44	28	7	10	7	13	3.01	3.07	......	0.06	S.W.	6.858
October	30.05	30.50	29.50	76	42	52	52	72	32	26	5	6	9	16	3.40	3.19	......	......	W.	8.850
November	30.07	30.51	29.50	77	37	46	40	67	25	26	4	5	7	18	1.19	3.29	......	2.10	S.W.	8.183
December	30.09	30.75	29.39	81	20	26	30	51	—1	30	5	5	21	21	4.75	3.60	1.65	......	W.	9.988
Year's average																				
New York	30.00	30.44	29.41	71	....	52	52	91	8	23	6	113	112	140	47.07	44.47	2.60	......	N.W.	128.906
Albany	30.00	30.48	29.45	76	39	48	48	92	—11	38	4	96	110	159	37.48	36.93	0.50	......	S.W.	67.161
Oswego	29.97	30.43	29.46	78	39	46	46	86	—12	36	2	68	112	185	37.87	35.95	1.90	......	S.E.	95.437
Rochester	30.00	30.41	29.50	77	40	48	47	91	6	41	3	79	139	147	29.68	34.66	......	4.90	S.W.	80.582
Buffalo	30.00	30.40	29.45	70	40	48	48	85	2	29	1	38	133	194	33.53	39.43	......	3.40	W.	129.640
Average for State	30.00	30.41	29.15	74	40	48	48	92	—12	38	1	79	121	165	37.15	38.50	......	1.30	W.	10.0345

Record of each reporting local board of health, showing total deaths from all causes and from the principal zymotic diseases for 1902, by counties

[Cities are printed in SMALL CAPS, villages in *italic* and towns in Roman type.]

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Albany county	**165,571**	**2,759**	**3**	**76**	**3**	**7**	**2**	**27**	**38**	**85**	**308**
ALBANY	94,151	1,623	2	29	2	2	2	10	26	37	215
COHOES	23,910	442		32		1		12	4	26	45
Berne	1,917	29			1						2
Bethlehem	4,226	51									2
Coeymans	3,952	52		2				2	2		2
Guilderland	3,530	60		2					2		3
Knox	1,244	14		1							2
New Scotland	3,058	50		1						1	3
Rensselaerville	1,795	30				2					1
Colonie	7,035	88				2					5
Westerlo	1,632	28									1
WATERVLIET	14,321	210	1	9				2	2	20	15
Green Island	4,770	82						1	2	1	12
Allegany county	**41,501**	**579**	**2**	**8**	**1**	**1**	**1**		**2**	**13**	**26**
Alfred	1,615	15									
Allen	655	5	1								1
Alma	1,182	13									1
Almond	1,436	19					1				2
Amity	2,216	22								3	
Andover	1,869	30									2
Angelica	1,639	36								3	1
Belfast	1,574	26								1	1
Birdsall											

Burns	1,424	29	.....	.....	.....	.....	.....	.....	.....	.....
Caneadea	1,310	24	.....	1	.....	.....	.....	.....	.....	2
Centerville	833	7	.....	.....	.....	.....	.....	.....	.....	1
Clarksville	836	16	.....	.....	.....	.....	.....	.....	.....	1
Cuba	2,369	38	.....	.....	.....	.....	.....	.....	.....	.....
Friendship	2,136	25	.....	.....	.....	.....	.....	.....	.....	3
Genesee	1,052	10	.....	.....	.....	.....	.....	.....	.....	.....
Granger	800	22	.....	.....	.....	.....	.....	.....	.....	3
Grove	812	5	.....	.....	.....	.....	.....	.....	.....	.....
Hume	1,749	28	.....	.....	.....	.....	.....	.....	.....	3
Independence	1,280	5	.....	.....	.....	.....	.....	.....	1	.....
New Hudson	926	17	.....	.....	.....	.....	.....	.....	.....	.....
Rushford	1,300	17	.....	1	.....	.....	.....	.....	.....	1
Scio	1,281	23	.....	.....	.....	1	.....	.....	1	1
Ward	547	1	.....	.....	.....	.....	.....	.....	.....	.....
Wellsville	4,981	82	.....	3	1	.....	.....	2	2	1
West Almond	601	9	.....	.....	.....	.....	.....	.....	.....	.....
Willing	1,246	8	.....	.....	.....	.....	.....	.....	.....	.....
Wirt	1,163	19	.....	2	.....	.....	.....	.....	.....	1
ome county	**69,149**	**1,100**	**3**	**15**	**2**	**9**	**1**	**7**	**15**	**19**	**36**
BINGHAMTON	39,647	725	1	11	2	8	1	3	15	19	20
Barker	1,072	14	.....	.....	.....	.....	.....	.....	.....	.....
Binghamton	817	9	.....	.....	.....	.....	.....	.....	.....	.....
Chenango	1,372	11	1	.....	.....	.....	.....	.....	.....	.....
Colesville	2,773	39	.....	1	.....	.....	4	.....	.....	3
Conklin	946	12	.....	.....	.....	1	.....	.....	.....	1
Dickinson	728	34	.....	.....	.....	.....	.....	.....	.....	2
Fenton	1,171	18	.....	.....	.....	.....	.....	.....	.....	2
Kirkwood	918	11	.....	.....	.....	.....	.....	.....	.....	1
Lisle	1,710	12	.....	.....	.....	.....	.....	.....	.....	.....
Maine	1,534	15	.....	.....	.....	.....	.....	.....	.....	.....
Nanticoke	666	9	.....	.....	.....	.....	.....	.....	.....	.....
Sanford	3,514	22	.....	1	.....	.....	.....	.....	.....	.....
Triangle	1,727	28	.....	.....	.....	.....	.....	.....	.....	2
Union	5,707	78	1	1	.....	.....	.....	.....	.....	3
Vestal	1,850	20	.....	.....	.....	.....	.....	.....	.....	.....
Windsor	2,967	43	.....	1	.....	.....	.....	.....	.....	2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Cattaraugus county	65,643	811	4	9	.....	7	10	2	7	21	24
OLEAN	9,612	117	2	3	.....	2	4	1	.....	6	5
Allegany	3,692	40	.....	.....	.....	.....	.....	.....	1	1	1
Ashford	1,645	15	.....	.....	.....	1	.....	.....	.....	.....	2
Carrollton	2,035	15	.....	.....	.....	.....	.....	.....	1	.....	.....
Cold Spring	1,030	7	.....	.....	.....	.....	.....	.....	.....	.....	1
Conewango	1,224	19	.....	.....	.....	.....	1	.....	.....	.....	1
Dayton	1,691	23	.....	.....	.....	.....	.....	.....	1	.....	.....
East Otto	1,138	13	.....	.....	.....	1	.....	.....	.....	.....	.....
Elko	571	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ellicottville	2,038	26	.....	.....	.....	.....	.....	.....	.....	1	2
Farmersville	1,013	8	.....	.....	.....	.....	.....	.....	.....	.....	1
Franklinville	2,514	41	.....	1	.....	.....	.....	.....	1	.....	.....
Freedom	1,209	17	.....	.....	.....	.....	.....	.....	.....	.....	.....
Great Valley	1,697	21	.....	.....	.....	.....	1	.....	.....	1	1
Hinsdale	1,218	15	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humphrey	794	7	.....	.....	.....	.....	.....	.....	.....	.....	1
Ischua	832	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leon	1,063	14	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Valley	1,616	29	1	.....	.....	.....	.....	.....	.....	1	.....
Lyndon	609	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Machias	1,557	35	.....	1	.....	.....	.....	.....	.....	.....	.....
Mansfield	968	8	.....	1	.....	.....	.....	.....	.....	1	.....
Napoli	967	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Albion	2,372	32	1	1	.....	.....	.....	.....	.....	.....	.....
Olean	1,854	60	.....	.....	.....	.....	1	.....	.....	1	3
Otto	1,105	17	.....	.....	.....	.....	1	.....	.....	.....	.....

Portville	2,319	14									
Randolph	2,605	12					1				1
Red House	973	7									
Salamanca	4,251	65		2		1	1	1	1	6	4
Salamanca	923	5									
South Valley	713	4				2					
Yorkshire	1,738	27								1	1
Cayuga county	**66,234**	**979**	**3**	**5**		**1**		**8**	**8**	**48**	**55**
AUBURN	30,345	480	2	3				5	6	42	33
Aurelius	1,563	28						1		1	1
Brutus	2,582	45									4
Cato	1,624	28						1			1
Conquest	1,360	16	1								1
Fleming	1,076	20									2
Genoa	2,075	20							1		
Ira	1,668	20								1	1
Ledyard	1,909	21							1		1
Locke	1,079	20									
Mentz	1,914	32						1		1	1
Montezuma	991	13									
Moravia	2,373	41				1					2
Niles	1,402	13		2							
Owasco	1,331	18									1
Scipio	1,657	22									1
Sempronius	896	9									
Sennett	1,440	37								2	4
Springport	1,770	23									
Sterling	2,516	34								1	1
Summer Hill	779	3									
Throop	1,038	14									
Venice	1,418	12									1
Victory	1,398	10									

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Chautauqua county	88,314	1,185	1	15	.....	9	8	1	35	36	77
DUNKIRK	11,616	233	.....	10	.....	4	4	.....	11	15	11
JAMESTOWN	22,892	259	1	1	.....	3	.....	.....	8	8	28
Arkright	918	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Busti	2,192	26	.....	.....	.....	.....	.....	.....	.....	1	1
Carroll	1,684	23	.....	.....	.....	.....	.....	.....	.....	1	1
Charlotte	1,406	21	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chautauqua	3,590	58	.....	2	.....	.....	.....	.....	.....	1	8
Cherry Creek	1,745	22	.....	.....	.....	.....	.....	.....	.....	.....	1
Clymer	1,229	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkirk	454	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ellery	1,628	24	.....	.....	.....	.....	.....	.....	.....	.....	3
Ellicott	3,118	33	.....	.....	.....	1	.....	.....	.....	.....	2
Ellington	1,330	21	.....	.....	.....	.....	.....	.....	.....	2	1
Fredonia	4,127	80	.....	1	.....	.....	2	.....	12	4	4
French Creek	1,014	5	.....	.....	.....	.....	1	.....	.....	.....	.....
Gerry	1,198	17	.....	.....	.....	.....	.....	.....	.....	.....	1
Hanover	4,778	44	.....	.....	.....	1	.....	.....	2	.....	3
Harmony	2,988	28	.....	.....	.....	.....	.....	.....	.....	.....	1
Kiantone	491	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mina	1,038	11	.....	.....	.....	.....	.....	.....	.....	.....	1
Poland	1,613	14	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pomfret	2,186	23	.....	.....	.....	.....	.....	.....	1	.....	.....
Portland	2,690	48	.....	.....	.....	.....	.....	.....	.....	1	2
Ripley	2,256	20	.....	.....	.....	.....	.....	.....	.....	2	.....
Sheridan	1,633	29	.....	.....	.....	.....	.....	.....	.....	1	3
Sherman	1,560	11	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stockton	1,852	21	.....	1	.....	.....	.....	.....	.....	.....	.....

Villanova	1,206	17					1			2
Westfield	1,452	19								1
Westfield	2,430	51				1		1		3
Chemung county	54,063	768	1	22			1	17	27	71
ELMIRA	35,672	494	1	14			1	12	22	55
Ashland	954	13								
Baldwin	664	3								
Big Flats	1,705	14						1		1
Catlin	1,109	12								1
Chemung	1,500	24		1						1
Elmira	1,260	32		2					1	3
Erin	996	14						1		1
Horseheads	4,944	76		1				1	3	6
Southport	2,201	31		2				1		
Van Etten	1,406	23		2					1	2
Veteran	1,652	32						1		1
Chenango county	36,568	524		4					4	32
Afton	1,920	38								1
Bainbridge	1,991	24								
Columbus	997	7								
Coventry	987	6								
German	423	4								
Greene	3,152	46							1	2
Guilford	2,208	31							1	
Lincklaen	646	4								
McDonough	907	14								
New Berlin	2,525	37		1						
North Norwich	801	10								2
Norwich	1,238	16								1
Norwich	5,766	110		2					2	14
Otselic	1,234	15								1
Oxford	3,545	59		1						3
Pharsalia	780	1								
Pitcher	751	7								
Plymouth	1,026	7								

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Chenango county—(*Continued*)											
Preston	662	21									1
Sherburne	2,614	34									3
Smithville	1,105	12									
Smyrna	1,290	21									4
Clinton county	**47,430**	**468**	**1**	**4**		**1**	**1**	**5**	**8**	**18**	**44**
Altona	2,465	19									1
Ausable	2,195	28									2
Beekmantown	2,067	32									2
Black Brook	1,933	20								1	
Champlain	4,748	37				1		1	1	1	3
Chazy	2,796	38	1					2		2	1
Clinton	1,574	8									
Dannemora	3,720	36									10
Ellenburg	3,248	4									1
Mooers	3,572	46		1						2	3
Peru	2,372	22					1			1	1
Plattsburg	3,178	6									1
Plattsburg	8,434	115		1				1	5	11	13
Saranac	3,463	42		2					1		5
Schuyler Falls	1,665	15						1	1		1
Columbia county	**43,211**	**642**		**12**				**4**	**1**	**12**	**52**
HUDSON	9,528	181		8				2	1	5	16
Ancram	1,238	17									1

Austerlitz	974	11									
Canaan	1,307	16									
Chatham	3,537	62						1		2	8
Claverack	4,416	51		2						1	5
Clermont	812	10									1
Copake	1,277	20								1	1
Gallatin	823	14									1
Germantown	1,686	13									1
Ghent	2,608	33								1	2
Greenport	1,191	18		1							1
Hillsdale	1,390	20									2
Kinderhook	3,333	52						1			4
Livingston	1,707	29								1	2
New Lebanon	1,556	20		1							2
Stockport	2,719	38								1	3
Stuyvesant	2,125	22									2
Taghkanick	894	15									
rtland county	**27,576**	**394**	**2**	**3**					**3**	**3**	**19**
Cincinnatus	912	19									
Cortlandville	2,868	58							2		3
CORTLAND	9,014	108	1	1					1	2	8
Cuyler	991	9									
Freetown	610	8									1
Harford	753	17									1
Homer	1,522	23									
Homer	2,381	38		1						1	3
Lapeer	538	9									
Marathon	1,664	16									
Preble	857	6									
Scott	852	17									1
Solon	622	11									
Taylor	762	4									
Truxton	1,217	19		1							
Virgil	1,326	16	1								1
Willett	687	16									1

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Delaware county	46,413	589	1					4	5	17	19
Andes	1,927	16							1		1
Bovina	932	11									
Colchester	3,156	62						1		2	1
Davenport	1,620	14									1
Delhi	3,243	30									2
Deposit	1,747	16						1			
Franklin	2,529	44									
Hamden	1,378	27									1
Hancock	5,308	44						2	1	5	1
Harpersfield	1,221	14									1
Kortwright	1,475	20									1
Masonville	1,245	20	1								
Meredith	1,508	28								1	
Middletown	3,619	62							1	4	2
Roxbury	2,134	24							1		1
Sidney	4,023	51							1	1	5
Stamford	1,997	29								2	1
Tompkins	2,482	24									
Walton	4,869	53								2	1
Dutchess county	81,670	1,304	3	17	4	2	1	10	25	41	99
POUGHKEEPSIE	24,029	423	1	5	3	1		5	17	14	43
Amenia	2,374	45	1							1	3
Beekman	1,071	16									1
Clinton	1,370	19									
Dover	1,959	31	1	1						3	
East Fishkill	1,970	36				1					2

Milan	950	18								1	2
North East	2,047	28		3					1	1	2
Pawling	1,921	38								2	
Pine Plains	1,263	15									
Pleasant Valley	1,483	25									
Poughkeepsie	5,943	47							1		
Red Hook	3,895	54									3
Rhinebeck	3,472	44		1						2	2
Stanford	1,624	36		1							2
Union Vale	945	13									1
Wappingers	1,692	31								1	1
Wappingers Falls	3,504	64		1				1	1	1	7
Washington	3,032	49							1		3
Erie county	**433,686**	**6,251**	**32**	**138**	**1**	**14**	**71**	**32**	**149**	**418**	**515**
BUFFALO	352,387	5,137	29	123	1	11	69	26	135	382	457
Tonawanda	7,421	114						2		4	8
Alden	2,396	37	1							2	2
Amherst	4,293	60								6	3
Aurora	4,015	59						1	1	2	3
Boston	1,398	11		1					1		
Brant	2,005	34					1	1	3		1
Cheektowaga	5,156	74							4	3	3
Clarence	2,948	37		1						1	4
Colden	1,260	10		1							1
Collins	3,753	69						1			6
Concord	4,086	58								2	2
East Hamburg	2,350	26									1
Eden	2,368	35		4		3					1
Elma	2,202	26								3	
Evans	2,795	23									2
Grand Island	1,036	13									1
Hamburg	4,673	83							2	4	4
Holland	1,434	17									

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Erie county—(*Continued*)											
Lancaster	8,757	89	......	1	......	......	......	1	......	5	5
Marilla	1,441	22	......	......	......	......	......	......	......	......	2
Newstead	3,844	44	......	......	......	......	......	......	......	......	2
North Collins	2,362	29	......	......	......	......	......	......	3	......	......
Sardinia	1,548	32	......	1	......	......	......	......	......	1	......
Tonawanda	1,205	......	......	......	......	......	......	......	......	......	......
Wales	1,220	19	......	......	......	......	......	......	......	......	1
West Seneca	5,363	93	2	1	......	......	1	......	......	3	6
Essex county	**30,707**	**427**	**3**	**6**	......	......	......	**2**	**1**	**9**	**45**
Chesterfield	2,362	30	......	......	......	......	......	......	......	1	3
Crown Point	2,112	22	1	......	......	......	......	......	......	......	2
Elizabethtown	1,131	16	......	1	......	......	......	......	......	......	1
Essex	1,333	20	......	......	......	......	......	......	......	......	3
Jay	1,744	27	......	1	......	......	......	......	......	......	3
Keene	1,394	15	......	......	......	......	......	......	......	......	1
Lewis	1,123	13	......	......	......	......	......	......	......	......	......
Minerva	1,052	9	......	1	......	......	......	......	......	......	......
Moriah	4,447	66	......	1	......	......	......	1	1	3	6
Newcomb	507	4	......	......	......	......	......	......	......	......	......
North Elba	1,670	27	......	......	......	......	......	......	......	2	4
North Hudson	541	1	......	......	......	......	......	......	......	1	......
St. Armand	739	11	......	......	......	......	......	......	......	......	5
Schroon	1,272	38	......	1	......	......	......	......	......	......	1
Ticonderoga	5,048	60	2	1	......	......	......	1	......	1	10
Westport	1,727	38	......	......	......	......	......	......	......	1	3

Wilmington											
Franklin county	**42,853**	**694**	......	**7**	......	**4**	**12**	**5**	**3**	**21**	**114**
Altamont	3,045	60	......	1	......	......	......	2	1	4	7
Bangor	2,221	33	......	......	......	......	......	......	......	......	4
Belmont	2,414	14	......	......	......	1	1	......	......	1	......
Bombay	2,742	44	......	1	......	......	......	......	1	......	9
Brandon	938	14	......	......	......	......	......	......	......	1	......
Brighton	706	16	......	......	......	......	......	......	......	......	3
Burke	1,936	15	......	......	......	1	1	......	......	......	1
Chateaugay	2,723	31	......	2	......	......	......	......	......	1	3
Constable	1,266	27	......	......	......	......	......	2	......	......	2
Dickinson	1,691	26	......	......	......	......	......	......	......	......	2
Duane	312	4	......	......	......	......	......	......	......	......	......
Fort Covington	2,043	39	......	......	......	......	1	......	......	1	3
Franklin	1,501	11	......	......	......	......	......	......	......	......	1
Harrietstown	1,142	38	......	......	......	......	......	......	......	......	15
Malone	5,935	106	......	1	......	2	8	1	......	8	11
Malone	4,074	70	......	......	......	......	......	......	......	1	3
Moira	2,184	31	......	1	......	......	......	......	......	1	5
Santa Clara	580	8	......	......	......	......	......	......	1	......	......
Saranac Lake	2,594	70	......	1	......	......	......	......	......	3	40
Waverly	1,615	16	......	......	......	......	1	......	......	......	3
Westville	1,237	21	......	......	......	......	......	......	......	......	2
Fulton county	**42,842**	**585**	**4**	**12**	......	**3**	......	......	**10**	**11**	**33**
GLOVERSVILLE	18,349	243	4	8	......	2	......	......	5	6	14
Bleecker	603	5	......	......	......	......	......	......	......	......	......
Broadalbin	1,946	25	......	......	......	......	......	......	......	......	......
Caroga	470	5	......	......	......	......	......	......	1	......	......
Ephratah	1,566	29	......	......	......	......	......	......	......	......	1
JOHNSTOWN	10,130	134	......	2	......	1	......	......	4	3	15
Johnstown	2,661	50	......	2	......	......	......	......	......	......	......
Mayfield	2,136	28	......	......	......	......	......	......	......	......	2
Northampton	2,226	39	......	......	......	......	......	......	......	2	......
Oppenheim	1,258	14	......	......	......	......	......	......	......	......	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Fulton county—(*Continued*)											
Perth	667	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stratford	830	80	.....	.....	.....	.....	.....	.....	.....	.....	1
Genesee county	**34,561**	**444**	**1**	**6**	.....	.....	.....	**3**	**2**	**11**	**25**
Alabama	1,957	28	.....	.....	.....	.....	.....	.....	.....	1	2
Alexander	1,503	13	.....	.....	.....	.....	.....	.....	.....	.....	.....
Batavia	9,180	104	1	2	.....	.....	.....	1	1	6	9
Batavia	2,250	30	.....	.....	.....	.....	.....	.....	.....	1	.....
Bergen	1,669	28	.....	1	.....	.....	.....	.....	.....	2	2
Bethany	1,512	29	.....	.....	.....	.....	.....	.....	.....	.....	1
Byron	1,330	16	.....	.....	.....	.....	.....	.....	.....	.....	.....
Darien	1,887	22	.....	.....	.....	.....	.....	1	.....	.....	2
Elba	1,526	18	.....	.....	.....	.....	.....	.....	.....	.....	3
Le Roy	3,144	52	.....	1	.....	.....	.....	.....	1	1	2
Le Roy	1,679	21	1	1	.....	.....	.....	.....	.....	.....	2
Oakfield	1,589	16	.....	.....	.....	.....	.....	.....	.....	.....	1
Pavilion	1,542	22	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembroke	2,425	34	.....	1	.....	.....	.....	1	.....	.....	1
Stafford	1,338	11	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greene county	**31,478**	**504**	**1**	**10**	**1**	**1**	.....	**1**	**7**	**16**	**40**
Ashland	692	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
Athens	2,891	43	.....	2	.....	.....	.....	.....	.....	.....	2
Cairo	2,176	30	.....	.....	.....	.....	.....	.....	.....	.....	2
Catskill	3,082	48	1	.....	1	.....	.....	1	.....	1	2
Catskill	5,484	101	.....	3	.....	1	.....	.....	.....	8	8
Coxsackie	4,102	65	.....	.....	.....	.....	.....	.....	6	3	5

Hunter	2,788	45		2					1	3	7
Jewett	1,028	13									1
Lexington	1,153	14		1							1
New Baltimore	2,283	29		1							1
Prattsville	775	12									1
Windham	1,387	35		1							5
Hamilton county	**4,947**	**39**	**1**								**2**
Arietta	247	1									
Benson	299	2									
Hope	463	1									
Indian Lake	1,219	13									1
Inlet		1									
Lake Pleasant	469	5									
Long Lake	1,023	10	1								1
Morehouse	319	2									1
Wells	908	4									
Herkimer county	**51,049**	**545**	**2**	**8**		**2**	**3**	**2**	**12**	**13**	**28**
Columbia	1,268	9									
Danube	1,043	7								1	
Fairfield	1,390	8								2	
Frankfort	4,472	66							2	2	
German Flats	3,525	52	1	2		1			2		1
Ilion	5,138	54	1						1	4	6
Herkimer	5,555	61		1			3		1		4
Herkimer	1,193	13									1
Litchfield	931	13									
LITTLE FALLS	10,381	92		4		1			4	3	6
Little Falls	718	1									
Manheim	2,648	27							1		1
Newport	1,613	14									
Norway	680	8									
Ohio	660	8						1			2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Herkimer county—(*Continued*)											
Russia	2,025	17									2
Salisbury	1,426	18									1
Schuyler	1,365	20									1
Stark	1,030	12									
Warren	1,240	22							1		
Webb	920	5		1							1
Wilmurt	353	4						1			1
Winfield	1,475	14								1	1
Jefferson county	**76,748**	**996**	**3**	**24**		**1**		**1**	**8**	**19**	**51**
WATERTOWN	21,696	317	1	15					6	12	20
Adams	3,081	33		2						1	1
Alexandria	3,894	44		2		1					4
Antwerp	3,008	42						1			2
Brownville	3,698	58									2
Cape Vincent	2,882	38		1							
Champion	2,525	36								1	1
Clayton	4,313	50	1							1	4
Ellisburg	3,888	52		2							3
Henderson	1,615	17									
Hounsfield	2,772	23									2
Le Ray	2,576	21									
Lorraine	1,019	14									
Lyme	2,200	31								2	3
Orleans	2,367	28		1							1
Pamelia	1,031	25									2
Philadelphia	1,750	10									

Rodman	1,212	11	...	...	...	...	...	...	...	...	...
Rutland	1,885	31	...	...	...	...	...	...	...	1	3
Theresa	2,130	30	...	...	...	...	...	...	2	...	1
Watertown	1,159	18	...	...	...	...	...	...	...	...	1
Wilna	5,172	58	1	1	...	...	...	...	...	1	1
Worth	875	9	...	...	...	...	...	...	...	...	...
Kings county*	...	...	...	...	...	...	...	...	...	...	...
Lewis county	**27,427**	**326**	**6**	**2**	...	**2**	...	...	...	**6**	**15**
Croghan	3,159	20	...	...	...	...	...	...	...	...	4
Denmark	2,193	32	...	...	...	...	...	...	...	1	1
Diana	2,083	22	...	...	...	...	...	...	...	...	...
Greig	1,100	13	...	...	...	...	...	...	...	...	1
Harrisburg	770	5	1	...	...	...	...	...	...	...	...
High Market	593	6	...	...	...	...	...	...	...	...	1
Lewis	917	8	...	...	...	...	...	...	...	...	...
Leyden	1,629	24	...	1	...	...	...	...	...	...	1
Lowville	3,746	67	4	1	...	...	...	...	...	2	5
Lyonsdale	1,371	12	...	...	...	...	...	...	...	...	...
Martinsburg	1,845	21	...	...	...	...	...	...	...	...	...
Montague	766	7	...	...	...	...	...	...	...	2	...
New Bremen	1,775	22	...	...	...	...	...	...	...	...	...
Osceola	629	5	...	...	...	1	...	...	...	...	1
Pinckney	934	14	...	...	...	...	...	...	...	...	1
Turin	1,157	14	...	...	...	...	...	...	...	...	...
Watson	981	12	...	...	...	...	...	...	...	1	...
West Turin	1,779	22	1	...	...	1	...	...	...	...	...
Livingston county	**37,059**	**470**	...	**2**	...	**1**	...	...	...	**11**	**26**
Avon	3,071	37	...	...	...	...	...	...	...	...	3
Caledonia	2,072	24	...	...	...	1	...	...	...	1	1
Conesus	1,149	15	...	...	...	...	...	...	...	2	...
Geneseo	3,613	51	...	...	...	...	...	...	...	...	3
Groveland	1,949	54	...	...	...	...	...	...	...	...	4
Leicester	1,415	21	...	...	...	...	...	...	...	...	...

*See the City of New York.

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Livingston County—(*Continued.*)											
Lima	2,279	23									1
Livonia	2,788	26									
Mt. Morris	3,715	54								2	3
North Dansville	328										
Dansville	3,633	58								3	6
Nunda	2,397	28		1							2
Ossian	780	3									
Portage	1,029	16									
Sparta	1,189	14									
Springwater	2,016	30		1						1	1
West Sparta	906	10								1	
York	2,730	26								1	2
Madison county	**40,545**	**568**	**2**	**10**		**1**		**3**	**5**	**8**	**30**
Brookfield	2,726	40		2						1	4
Cazenovia	3,830	69		1		1		1			2
De Ruyter	1,410	22						1			2
Eaton	2,705	44									1
Fenner	911	13									
Georgetown	908	24		2							
Hamilton	3,741	40		1						1	4
Lebanon	1,243	16									
Lenox	4,679	64							1	2	3
Lincoln	1,052	15									
Oneida	6,361	108	1	3				1	4	2	8
Oneida	1,171										
Madison	2,024	19									

Nelson	1,296	18								1
Smithfield	980	9								
Stockbridge	1,622	22							1	3
Sullivan	3,778	45	1	1					1	2
onroe county	**217,854**	**3,036**	**10**	**24**		**12**	**1**	**14**	**19**	**134**	**240**
ROCHESTER	162,608	2,306	8	19		11	1	11	14	112	191
Brighton	3,815	49		1						2	1
Chili	2,099	22									
Clarkson	1,581	28									1
Gates	3,468	43								2	4
Greece	5,579	89				1			1	6	4
Hamlin	2,188	24									3
Henrietta	2,062	22									
Irondequoit	2,863	29								2	1
Mendon	2,760	35								2	1
Ogden	2,616	34									2
Parma	2,814	28								1	3
Penfield	2,857	49	1						1	2	2
Perinton	4,703	61	1	3					2		7
Pittsford	2,373	27								1	3
Riga	1,864	27									
Rush	1,491	22		1							2
Sweden	1,345	19									
Brockport	3,398	45							1	2	6
Webster	3,289	52						1		2	8
Wheatland	2,071	25						2			1
ntgomery county	**47,488**	**680**		**6**		**45**		**1**	**7**	**28**	**45**
AMSTERDAM	20,929	354		4		42			4	24	28
Amsterdam	3,202	38				3				3	4
Canajoharie	3,888	44		1				1			1
Charleston	1,052	10									1
Florida	1,988	18									
Glen	2,281	26							2		1
Minden	2,097	21									
Fort Plain	2,444	39								1	2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Montgomery county *(Continued)*											
Mohawk	2,711	39									
Palatine	2,569	37		1							4
Root	1,653	16									1
St. Johnsville	2,674	38							1		3
Nassau county	**55,448**	**835**	**3**	**9**	**2**	**4**	**6**	**11**	**13**	**48**	**68**
Hempstead	27,066	363	2	6	1	1	2	7	7	16	30
North Hempstead	12,048	204		3	1	2	3	3	1	10	14
Oyster Bay	16,334	268	1			1	1	1	5	22	24
New York, City of	**3,437,202**	**68,131**	**252**	**762**	**127**	**941**	**710**	**607**	**2,013**	**5,776**	**7,589**
Borough of Manhattan	1,850,093	36,771	174	366	52	446	305	318	1,043	2,913	3,739
Borough of Bronx	200,507	4,935	15	34	15	189	157	67	99	332	1,156
Borough of Brooklyn	1,166,582	22,344	55	322	48	275	239	189	762	2,075	2,317
Borough of Queens	152,999	2,800	8	29	9	13	6	13	90	298	246
Borough of Richmond	67,021	1,281		11	3	18	3	20	19	158	131
Niagara county	**74,961**	**1,088**	**2**	**45**	**1**	**20**	**12**	**11**	**18**	**46**	**53**
LOCKPORT	16,581	237		6		3	2		5	6	15
NIAGARA FALLS	19,457	376	1	33	1	16	5	8	8	23	19
Cambria	1,880	18		1							
Hartland	2,728	36					2				1
Lewiston	3,221	30		1					1	1	1
Lockport	2,585	25		1		1					1
Newfane	3,248	37								1	1
Niagara	1,066	9									
Pendleton	1,364	10									

Porter	[illegible]	[illegible]								1	
Royalton	4,797	67								1	3
Somerset	1,923	36									2
Wheatfield	1,926	25		1							3
NORTH TONAWANDA	9,069	114	1	1			3	3	4	12	5
Wilson	2,881	43		1						1	2
eida county	**132,800**	**1,995**	**6**	**25**		**4**	**8**	**3**	**24**	**67**	**178**
UTICA	56,383	1,075	4	12		3	7	2	14	52	106
ROME	15,243	261	1	4					3	5	26
Annsville	1,744	21									3
Augusta	2,029	22						1			1
Ava	706	2									
Boonville	3,332	47								2	5
Bridgewater	931	14		1							
Camden	3,745	55							2		3
Deerfield	1,756	25									1
Florence	1,207	14									
Floyd	785	8		1							
Forestport	1,562	17									1
Kirkland	4,545	49		1		1					2
Lee	1,571	26									1
Marcy	1,398	11								1	
Marshall	1,566	27		1							1
New Hartford	5,230	68	1	1						1	4
Paris	2,626	21									1
Remsen	1,208	14								1	
Rome		1									
Sangerfield	1,107	39		2						1	4
Steuben	902	8									1
Trenton	2,628	30									2
Vernon	2,784	38							1		2
Verona	3,875	56							2		
Vienna	2,218	24									2
Waterville	1,571	1									
Western	1,621	20									
Westmoreland	2,192	26									2
Whitestown	6,235	75		2			1		2	4	10

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Onondaga county	168,735	2,367	13	22		5	6	14	23	98	207
SYRACUSE	108,374	1,513	10	10		5	4	10	15	84	133
Camillus	2,543	42		2					2		2
Cicero	2,611	38									3
Clay	2,578	31		1							
De Witt	5,435	72		2						2	7
Elbridge	3,327	49									3
Fabius	1,686	22		1							2
Geddes	4,387	80	1				2	3	1	4	7
La Fayette	1,892	26								1	2
Lysander	3,026	39		2					2		2
Baldwinsville	2,902	42		1						3	5
Manlius	5,374	74	1	1						2	6
Marcellus	2,581	32							1		3
Onondaga	5,580	104	1						1	1	17
Otisco	1,202	20		1							1
Pompey	2,546	31		1				1			2
Salina	3,745	31									3
Skaneateles	4,205	58								1	6
Spafford	1,159	14									
Tully	1,465	15							1		1
Van Buren	2,117	34									2
Ontario county	49,605	729	2	7	1	1		1	5	20	30
Bristol	1,310	20									1
Canadice	674	11									
Canandaigua	2,133	14									1
Canandaigua	6,151	105		2		1			2	5	5

East Bloomfield	1,940	22									
Farmington	1,607	19		1							
Geneva	1,091	14							2		
GENEVA	10,433	167	1	1						10	11
Gorham	2,131	35								1	1
Hopewell	1,550	36									
Manchester	4,733	70	1	1				1			2
Naples	2,370	28									
Phelps	4,788	66		1	1					2	5
Richmond	1,381	23									1
Seneca	2,654	47							1	1	2
South Bristol	1,104	7		1							
Victor	2,249	29								1	
West Bloomfield	1,306	16									1
ange county	**103,859**	**1,608**	**9**	**33**	**1**	**28**	**4**	**8**	**31**	**89**	**149**
NEWBURGH	24,943	471	6	12		25		1	8	31	58
MIDDLETOWN	14,522	236	2	8	1		2	1	1	19	26
Blooming Grove	2,188	49							2	2	
Chester	2,186	38									2
Cornwall	4,258	54							1		4
Crawford	1,778	20								1	
Deerpark	1,932	40		2				1		2	2
Port Jervis	9,385	176	1	5				2	7	10	15
Goshen	4,564	93		1				1	1	5	10
Greenville	800	7									
Hamptonburg	1,072	7		1							
Highlands	4,519	58							1	3	4
Minisink	1,505	14									
Monroe	1,784	32								1	3
Montgomery	5,939	85				2			8	5	6
Mount Hope	1,236	12								1	1
Newburgh	4,246	40		1					1	2	2
New Windsor	2,392	31				1			1		2
Tuxedo	2,277	29		1			2			1	3
Walkill	2,725	19						1		2	1
Warwick	6,403	62								4	6

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Orange county—(*Continued*)											
Wawayanda	1,539	15	.....	1	.....	.....	.....	.....	.....	.....	2
Woodbury	1,666	20	.....	1	.....	.....	.....	1	.....	.....	2
Orleans county	**30,164**	**408**	.....	**7**	.....	.....	.....	**1**	**3**	**10**	**29**
Albion	4,447	73	.....	6	.....	.....	.....	1	.....	2	11
Albion	1,398	25	.....	1	.....	.....	.....	.....	.....	1	.....
Barre	1,937	20	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carlton	2,338	25	.....	.....	.....	.....	.....	.....	.....	.....	2
Clarendon	1,518	26	.....	.....	.....	.....	.....	.....	.....	.....	2
Gaines	1,763	34	.....	.....	.....	.....	.....	.....	.....	1	1
Kendall	1,616	21	.....	.....	.....	.....	.....	.....	.....	1	1
Murray	3,656	42	.....	.....	.....	.....	.....	.....	.....	1	1
Ridgeway	2,753	33	.....	.....	.....	.....	.....	.....	.....	.....	3
Medina	4,716	69	.....	.....	.....	.....	.....	.....	2	4	7
Shelby	2,108	21	.....	.....	.....	.....	.....	.....	1	.....	.....
Yates	1,884	19	.....	.....	.....	.....	.....	.....	.....	.....	1
Oswego county	**7,881**	**974**	**5**	**10**	.....	.....	**1**	**3**	**5**	**16**	**94**
OSWEGO	22,199	324	2	4	.....	.....	.....	.....	4	12	36
Albion	1,724	30	.....	1	.....	.....	1	.....	.....	.....	3
Amboy	824	6	.....	.....	.....	.....	.....	2	.....	.....	.....
Boylston	849	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Constantia	2,259	16	.....	.....	.....	.....	.....	.....	.....	.....	2
Granby	5,120	25	.....	.....	.....	.....	.....	.....	.....	.....	4
Hannibal	2,473	26	.....	.....	.....	.....	.....	.....	.....	.....	2
Hastings	2,303	26	.....	.....	.....	.....	.....	.....	.....	.....	6
Mexico	3,091	61	.....	.....	.....	.....	.....	.....	.....	.....	4

New Haven	1,408	22									
Orwell	1,149	21									3
Oswego	2,737	51		1							7
Palermo	1,407	23									3
Parish	1,530	19	1	1							1
Redfield	911	10									
Richland	3,535	54	1	1						1	3
Sandy Creek	2,232	25									2
Schroeppel	3,012	38	1						1	1	1
Scriba	2,480	26		1							1
Volney	2,393	29									1
Fulton	5,281	106		1				1		2	13
West Monroe	936	7									
Williamstown	1,028	21									2
Otsego county	**48,939**	**662**	**1**	**13**		**2**		**2**		**8**	**31**
Burlington	1,263	9									
Butternuts	1,698	11		2							
Cherry Valley	1,802	20	1								
Decatur	559	7									2
Edmeston	1,767	18		1							
Exeter	1,087	13									3
Hartwick	1,800	28									1
Laurens	1,483	22								1	2
Maryland	1,998	33				1					1
Middlefield	2,058	44								1	
Milford	2,007	27		1							1
Morris	1,689	25		1							2
New Lisbon	1,225	17								1	1
Oneonta	1,763	22								1	
Oneonta	7,147	99		5		1		1		2	5
Otego	1,817	22									1
Otsego	1,171	29									1
Cooperstown	2,368	42								1	2
Pittsfield	1,101	10		1							1
Plainfield	897	12									1
Richfield	2,526	28		1							1

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria.	Diarrhea	Consumption
Otsego county (*Continued*)											
Roseboom	1,031	10									1
Springfield	1,762	28									1
Unadilla	2,601	40								1	1
Westford	910	12									
Worcester	2,409	34		1				1			3
Putnam county	**13,787**	**206**							**4**	**4**	**12**
Carmel	2,598	32								3	2
Kent	1,026	24									2
Patterson	1,644	16									1
Phillipstown	4,642	77							3		4
Putnam Valley	1,034	12							1		
South East	2,843	45								1	3
Rensselaer county	**121,697**	**2,087**	**7**	**52**	**2**	**2**	**3**	**12**	**16**	**76**	**232**
TROY	60,651	1,430	5	37	2	2	1	6	12	63	195
Berlin	1,677	28									2
Brunswick	3,513	33		1				1			
East Greenbush	2,036	15								1	1
Grafton	1,136	16									
RENSSELAER	7,466	162	2	8			1	4	2	6	14
Hoosick	2,960	33		1							
Hoosick Falls	5,671	92							1	1	12
Lansingburg	344										
Nassau	2,073	23									
North Greenbush	1,719	17								1	2
Petersburg	1,449	21								1 1	1 2

Pittstown	3,236	51	......	5	......	......	......	1	......	......	2
Poestenkill	1,342	18	......	......	......	......	......	......	......	......	......
Sand Lake	2,299	38	......	......	......	......	......	......	......	1	......
Schaghticoke	2,631	37	......	......	......	......	......	......	......	1	1
Schodack	4,334	52	......	......	......	......	......	......	1	......	......
Stephentown	1,545	21	......	......	......	......	1	......	......	......	......
Richmond county *	......	......	......	......	......	......	......	......	......	......	......
Rockland county	**38,298**	**556**	**1**	**6**	**1**	**3**	**2**	**12**	**7**	**30**	**48**
Clarkstown	6,305	73	......	......	......	......	......	......	......	1	2
Haverstraw	9,874	138	......	2	......	3	......	2	3	7	16
Orangetown	6,181	94	1	1	......	......	1	......	3	......	9
Nyack	4,275	69	......	......	......	......	1	......	......	2	11
Ramapo	7,502	141	......	3	1	......	......	10	1	18	5
Stony Point	4,161	41	......	......	......	......	......	......	......	2	5
St. Lawrence county	**89,083**	**1,045**	**6**	**21**	......	......	......	**5**	**3**	**40**	**78**
OGDENSBURG	12,633	204	4	8	......		......	......	......	14	18
Brasher	2,703	27	1	1	......		......	......	......	1	1
Canton	6,387	80	......	1	......		......	1	......	4	5
Clare	330	......	......	......	......	......	......	......	......	......	......
Clifton	1,382	8	......	......	......	......	......	......	......	......	......
Colton	1,678	18	1	1	......	......	......	......	......	1	......
De Kalb	2,723	24	......	......	......	......	......	......	......	......	1
De Peyster	936	9	......	......	......	......	......	......	......	......	......
Edwards	1,340	17	......	......	......	......	......	1	......	......	......
Fine	1,694	19	......	2	......	......	......	......	......	2	......
Fowler	1,716	16	......	......	......	......	......	......	......	......	1
Gouverneur	5,915	92	......	4	......	......	......	......	......	5	6
Hammond	1,764	17	......	......	......	......	......	......	......	......	2
Hermon	1,542	25	......	......	......	......	......	......	......	......	1
Hopkinton	2,521	27	......	......	......	......	......	......	......	1	......
Lawrence	1,963	27	......	......	......	......	......	......	......	......	3
Lisbon	5,255	24	......	......	......	......	......	......	......	......	4
Louisville	1,621	18	......	......	......	......	......	......	......	2	1

*See the City of New York.

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
St. Lawrence county—*(Continued)*											
Macomb	1,374	8	......	......	......	......	......	......	......	......	......
Madrid	1,668	26	......	......	......	......	......	......	......	1	2
Massena	3,904	56	......	......	......	......	......	......	1	1	7
Morristown	1,798	21	......	2	......	......	......	......	......	......	1
Norfolk	1,911	14	......	1	......	......	......	1	......	1	......
Oswegatchie	2,368	27	......	......	......	......	......	......	......	......	1
Parishville	2,086	35	......	......	......	......	......	......	1	1	1
Piercefield	......	8	......	......	......	......	......	......	......	......	......
Pierrepont	1,885	16	......	......	......	......	......	......	......	......	1
Pitcairn	902	3	......	......	......	......	......	......	......	......	......
Potsdam	5,211	45	......	......	......	......	......	2	......	2	5
Potsdam	3,843	63	......	1	......	......	......	......	1	3	9
Rossie	1,136	12	......	......	......	......	......	......	......	......	2
Russell	2,067	24	......	......	......	......	......	......	......	......	2
Stockholm	2,826	16	......	......	......	......	......	......	......	......	2
Waddington	2,001	19	......	......	......	......	......	......	......	1	2
Saratoga county	**61,080**	**1,054**	**6**	**9**	**1**	**1**	......	**2**	**8**	**31**	**85**
Ballston Spa	3,923	76	......	......	......	......	......	1	......	1	5
Ballston	1,501	24	......	......	......	......	......	......	......	......	......
Charlton	1,109	18	......	......	......	......	......	......	......	......	......
Clifton Park	2,140	28	......	......	......	......	......	......	......	......	......
Corinth	3,104	56	......	2	......	......	......	......	......	1	4
Day	719	8	......	......	......	......	......	......	......	1	......
Edinburg	1,032	10	......	......	......	......	......	......	......	......	1
Galway	1,350	18	......	......	......	......	......	......	......	......	1
Greenfield	1,837	28	......	......	......	......	......	......	......	......	3

Hadley	914	18	.....	1	.....	.....	.....	.....	1	1	3
Halfmoon	1,906	39	1	1	.....	.....	.....	.....	.....	1	1
Malta	1,322	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mechanicville	4,695	92	.....	2	.....	1	.....	.....	2	5	6
Milton	2,536	74	3	.....	.....	.....	.....	.....	.....	1	9
Moreau	2,999	54	1	1	.....	.....	.....	.....	.....	1	3
Northumberland	1,227	18	.....	.....	.....	.....	.....	.....	.....	.....	4
Providence	607	10	.....	.....	.....	.....	.....	.....	1	.....	.....
Saratoga	3,999	37	.....	.....	.....	.....	.....	.....	.....	.....	1
Saratoga Springs	1,125	20	.....	.....	.....	.....	.....	.....	.....	.....	1
Saratoga Springs	12,409	265	1	1	1	.....	.....	1	.....	16	28
Stillwater	3,489	47	.....	.....	.....	.....	.....	.....	2	.....	4
Waterford	6,157	92	.....	1	.....	.....	.....	.....	2	3	11
Wilton	989	14	.....	.....	.....	.....	.....	.....	.....	.....	.....
Schenectady county	**46,852**	**822**	**2**	**12**	.....	**10**	**5**	**2**	**43**	**77**	**68**
SCHENECTADY	31,682	658	1	11	.....	14	5	1	33	75	59
Duanesburg	2,428	21	.....	.....	.....	.....	.....	.....	.....	.....	.....
Glenville	3,010	51	.....	.....	.....	5	.....	.....	6	.....	3
Niskayuna	1,327	21	1	.....	.....	.....	.....	.....	.....	.....	2
Princetown	694	11	.....	.....	.....	.....	.....	.....	1	.....	1
Rotterdam	7,711	60	.....	1	.....	.....	.....	1	3	2	3
Schoharie county	**26,854**	**403**	**1**	**3**	.....	.....	.....	.....	**1**	**13**	**22**
Blenheim	768	13	.....	.....	.....	.....	.....	.....	.....	.....	.....
Broome	1,153	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carlisle	1,225	18	.....	.....	.....	.....	.....	.....	.....	.....	1
Cobleskill	3,973	76	1	2	.....	.....	.....	.....	.....	9	5
Conesville	793	11	.....	.....	.....	.....	.....	.....	.....	.....	1
Esperance	1,096	15	.....	.....	.....	.....	.....	.....	.....	.....	2
Fulton	1,998	29	.....	1	.....	.....	.....	.....	.....	.....	1
Gilboa	1,448	16	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jefferson	1,409	19	.....	.....	.....	.....	.....	.....	.....	.....	1
Middleburg	2,738	50	.....	.....	.....	.....	.....	.....	1	.....	1
Richmondville	1,719	24	.....	.....	.....	.....	.....	.....	.....	.....	3
Schoharie	2,900	42	.....	.....	.....	.....	.....	.....	.....	2	2
Seward	1,404	14	.....	.....	.....	.....	.....	.....	.....	1	.....

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Schoharie county—(*Continued*)											
Sharon	2,058	27								1	2
Summit	1,217	21									2
Wright	1,155	19									1
Schuyler county	**15,811**	**232**						**1**	**2**	**7**	**11**
Catherine	1,386	10									
Cayuta	459	7									
Dix	3,894	60							1	1	2
Hector	4,137	64							1	6	4
Montour	1,623	25						1			2
Orange	1,391	26									2
Reading	1,335	16									
Tyrone	1,586	24									1
Seneca county	**28,114**	**390**		**4**					**2**	**7**	**34**
Covert	1,897	34		1						1	2
Fayette	2,056	28									2
Lodi	1,636	22									3
Ovid	3,734	24									2
Romulus	2,895	36							1		4
Seneca Falls	786	8								1	
Seneca Falls	6,519	102		1					1	4	13
Tyre	954	7									1
Varick	1,270	12									
Waterloo	1,058	19								1	
Waterloo	4,256	79		1							6

Steuben county	**82,322**	**981**	**2**	**14**		**3**		**1**	**13**	**22**	**54**
CORNING	11,061	149		3		1			6	3	16
HORNELLSVILLE	11,918	154		4				1	3	6	10
Addison	2,637	31									2
Avoca	2,125	29								1	
Bath	3,443	62		2						1	5
Bath	4,494	35	1						1	1	3
Bradford	771	9	1								
Cameron	1,353	12		1							
Campbell	1,467	30								2	1
Canisteo	3,432	43		1						1	2
Caton	1,345	7									1
Cohocton	3,197	39							1	1	4
Corning	1,937	22								1	3
Dansville	1,417	16									
Erwin	1,851	27		1							
Fremont	1,033	13							1		
Greenwood	1,129	21									2
Hartsville	787	11									1
Hornby	959	11								1	
Hornellsville	1,833	29									1
Howard	1,704	27							1		2
Jasper	1,430	19									1
Lindley	1,306	11				1					
Plattsburg	2,197	24									
Pultney	1,590	11									
Rathbone	1,059	10		1		1					
Thurston	1,017	10									
Troupsburg	2,015	15								1	
Tuscarora	1,301	5									
Urbana	2,692	34								1	
Wayland	2,984	37								2	
Wayne	838	4									
West Union	1,025	5									
Wheeler	1,188	5									
Woodhull	1,787	14									

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Suffolk county	77,582	1,355	2	14	2	5	5	7	13	55	125
Babylon	7,112	135		2		1		1	4	4	12
Brookhaven	14,592	209		5			4	1	2	9	18
East Hampton	2,724	38								1	1
Huntington	9,483	109		2	1	4				5	8
Islip	12,545	330	2	2			1	3	4	3	40
Riverhead	4,503	51							1	1	1
Shelter Island	1,066	14									
Smithtown	5,863	229		1						11	33
Southampton	9,424	101		1				2	1	2	7
Sag Harbor	1,969	43		1	1					5	3
Southold	8,301	96							1	14	2
Sullivan county	32,306	477		7		1	1		1	13	74
Bethel	2,248	31								1	1
Callicoon	2,054	24								1	1
Cochecton	1,117	15									1
Delaware	1,541	23									1
Fallsburg	2,974	28		1							4
Forestburg	625	4									
Fremont	2,184	21								3	1
Highland	964	20									2
Liberty	4,568	117		4			1			6	43
Lumberland	809	11		1							2
Mamakating	3,128	45									1
Neversink	2,030	21				1					1
Rockland	3,426	38							1		4
Thompson	3,739	70		1						2	10
Tusten	800	9									2

Tioga county	**27,951**	**397**		**4**	**1**	**1**		**2**	**8**	**14**	**18**
Waverly	4,465	62		1		1		1		4	3
Barton	1,916	28								1	1
Berkshire	1,011	12									1
Candor	3,330	40								2	1
Newark Valley	2,164	30							3		
Nichols	1,564	17								1	3
Owego	3,339	60						1	1		2
Owego	5,039	83		2	1				3	3	5
Richford	1,142	14								1	
Spencer	1,868	21		1						1	
Tioga	2,113	30							1	1	2
Tompkins county	**33,830**	**490**	**2**	**3**				**2**	**3**	**11**	**43**
ITHACA	13,136	214	1	1				1	3	9	31
Caroline	1,938	22								1	
Danby	1,449	24									1
Dryden	3,785	55	1	1							4
Enfield	1,214	16								1	
Groton	3,564	48						1			2
Ithaca	1,516	11									1
Lansing	2,550	39									1
Newfield	1,902	22		1							1
Ulysses	2,776	39									2
Ulster county	**88,422**	**1,294**	**4**	**26**	**3**	**4**	**2**	**4**	**24**	**48**	**130**
KINGSTON	24,535	399	1	4	2	1		2	8	19	45
Denning	783	6									
Esopus	4,907	77		4					2	3	7
Gardiner	1,509	22									
Hardenburg	722	2									
Hurley	1,903	25								1	6
Kingston	524	8									1
Lloyd	2,608	36								3	3
Marbletown	3,511	37								1	9
Marlborough	3,978	40		2				1		1	3
New Paltz	2,264	44		2						2	5

Record of each reporting local board of health, etc.—(Continued)

NAME AND PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Ulster county—*(Continued)*											
Olive	2,465	30		1							1
Plattekill	1,866	16								1	3
Rochester	2,874	45		1						3	5
Rosendale	6,278	77		4					6	3	6
Saugerties	6,057	104	1	2			1	1		4	9
Saugerties	3,697	67	1	1						1	7
Shandaken	3,053	48					1				2
Shawangunk	2,406	30				1			1		3
Ulster	3,582	33	1						1		2
Wawarsing	4,346	77		3		1			1	2	8
Ellenville	2,879	51		2	1	1			5	4	5
Woodstock	1,675	20									
Warren county	**29,943**	**393**	**6**	**7**	**1**	**2**			**2**	**8**	**36**
Bolton	1,363	13								1	
Caldwell	1,465	17		1							
Chester	2,052	17	1	1							4
Hague	1,042	3									
Horicon	1,136	15									1
Johnsburg	2,374	29	1							1	2
Luzerne	1,341	16		1							1
Queensbury	2,377	36		1						1	
Glens Falls	12,613	106	4	2	1	2			2	3	28
Stony Creek	1,019	15									
Thurman	809	7									
Warrensburg	2,352	29		1						2	

Argyle	1,995	42									1
Cambridge	1,878	26								1	1
Dresden	545	7									1
Easton	2,247	22									
Fort Ann	2,263	28									3
Fort Edward	5,216	86		2					5	4	13
Sandy Hill	4,473	65	1	1					2		5
Granville	5,217	88	1	1		3		1	4	3	8
Greenwich	4,172	74		5						3	6
Hampton	689	12									
Hartford	1,290	16									
Hebron	1,679	24									1
Jackson	1,059	17					1		1		1
Kingsbury	1,627	12									3
Putnam	505	6							1		
Salem	2,978	41				3					2
White Creek	2,496	35									2
Whitehall	919	4									
Whitehall	4,377	75		2					3	2	3
Wayne county	**48,660**	**611**	**1**	**13**					**3**	**8**	**39**
Newark	4,578	63		1						2	5
Arcadia	2,468	21									2
Butler	1,786	22									2
Galen	2,099	15		2							
Clyde	2,507	42		1						1	3
Huron	1,667	20								1	
Lyons	5,824	82		5						3	9
Macedon	2,488	36							1		
Marion	2,015	30									1
Ontario	2,550	19								1	
Palmyra	3,758	57		1					2		3
Rose	2,055	32		1							3
Savannah	1,733	25									1
Sodus	5,118	67	1	1							5
Walworth	2,137	21									2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Wayne county—(*Continued*)											
Williamson	2,670	22									1
Wolcott	3,207	37		1							2
Westchester county	**183,375**	**3,147**	**9**	**23**	**2**	**14**	**13**	**31**	**71**	**252**	**281**
YONKERS	47,931	865	2	5	1	7	1	5	20	99	87
MOUNT VERNON	20,346	310	1	2	1	4	3	3	6	28	30
Bedford	3,497	92						1	1		27
Cortlandt	8,345	119								5	3
Peekskill	10,358	262		3			4	4	10	29	27
East Chester	3,040	70						3	2	18	1
Greenburg	14,894	220	3	1			1	2	4	7	25
Harrison	2,048	36								1	2
Lewisboro	1,311	27								4	1
Mamaroneck	3,849	91						1	2	6	4
Mount Pleasant	8,698	178		2					1	8	21
New Castle	2,401	35									2
NEW ROCHELLE	14,720	231	1	5			2	9	4	11	11
North Castle	1,471	18									2
North Salem	1,133	10									1
Ossining	2,956	3									
Ossining	7,939	143		2					2	11	11
Pelham	1,571	22									1
Poundridge	823	17									
Port Chester	7,440	163	1	3		2		2	15	13	6
Rye	5,421	54				1				3	7
Scarsdale	885	12								1	
Somers	1,338	19								2	

Wyoming county	**30,413**	**430**		**5**						**8**	**23**
Arcade	1,877	34									1
Attica	2,677	33								1	
Bennington	1,904	30								1	2
Castile	2,539	35								1	1
Covington	930	17		1						1	2
Eagle	1,114	13									
Gainesville	2,325	37		1							2
Genesee Falls	658	9									
Java	1,770	15									1
Middlebury	1,406	15								1	
Orangeville	1,005	21								1	1
Perry	3,862	54		2							4
Pike	1,277	14									
Sheldon	1,801	23									3
Warsaw	4,341	68		1						2	6
Wethersfield	927	12									
Yates county	**20,318**	**267**	**1**	**3**		**1**			**2**	**3**	**14**
Barrington	1,249	12									1
Benton	1,970	13									1
Dundee	1,291	2									
Italy	1,091	8									
Jerusalem	2,775	26									
Middlesex	1,282	17									2
Milo	1,877	25									
Penn Yan	4,650	96		2		1			1	2	6
Potter	1,520	21	1	1							
Starkey	1,545	35							1	1	3
Torrey	1,065	12									1
State prisons		12									3
State asylums		1,024		6					5	13	133
Other public institutions		258								3	21

[618 deaths in public institutions have been credited elsewhere, to the localities in which they are situated.]

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,918,906	6,710	20.0	2,218	33.0	765	120	24	57
CITY OF NEW YORK									
Totals	3,632,501	6,289	20.5	2,119	33.4	682	122	24	51
BOROUGH OF MANHATTAN	1,895,491	3,519	21.8	1,305	37.8	305	122	14	23
BOROUGH OF THE BRONX	244,141	477	23.0	136	28.8	44	200	..	1
BOROUGH OF BROOKLYN	1,249,650	2,002	19.4	605	30.2	283	110	10	25
BOROUGH OF QUEENS	172,472	199	13.6	54	27.0	25	60	....	1
BOROUGH OF RICHMOND	70,747	92	15.6	19	20.6	25	87	....	1
Oyster Bay	16,334	30	16.0	5	16.7	9	33	....	....
Hempstead	27,066	18	....	3	....	5	....	....	2
North Hempstead	12,048	17	17.0	6	36.0	4	120	....	....
Southold	8,301	11	....	2	19.2	5	100	....	....
Sag Harbor	2,000	2	....	0	....	1	....	....	....
Huntington	9,483	6	....	2	....	1	....	....	....
Brookhaven	14,592	21	16.5	3	15.0	7	333	....	1
YONKERS	47,931	71	17.0	22	30.0	14	114	....	....
Greenburg	15,564	17	13.5	3	17.7	2	177	....	1
MOUNT VERNON	20,346	21	12.6	7	33.3	2	195	....	....
Port Chester	7,440	9	....	2	22.2	1	....	....	....
Ossining	7,939	9	....	1	11.1	2	....	....	....
NEW ROCHELLE	14,720	20	17.0	7	35.0	3	50	....	....
Peekskill	10,358	18	20.0	7	39.0	4	55	....	....
White Plains	7,900	12	....	2	16.6	1	166	....	....
Rest of District	94,383	139	17.3	27	20.0	22	85	....	2
HUDSON VALLEY DISTRICT									
Totals	690,000	924	16.0	149	16.2	250	85	1	33
ALBANY	94,151	140	17.5	16	11.4	31	43	....	2
COHOES	24,000	39	18.6	8	21.0	4	210	....	7
TROY	75,057	102	16.0	22	22.0	18	90	....	6
WATERVLIET	14,321	26	21.0	5	19.2	4	154	....	3
Green Island	1,770	8	....	3	37.5	1	375	....	....
Hoosick Falls	5,671	3	....	0	....	0	....	....	....
RENSSELAER	10,000	16	....	3	....	2	....	1	2
Coxsackie	4,192	3	....	0	....	1	....	....	....
Catskill	5,486	5	....	0	....	4	....	....	....
HUDSON	9,528	12	15.0	2	16.6	4	166	....	1
KINGSTON	21,535	27	13.5	7	26.0	7	37	....	....
Ellenville	3,000	6	....	2	33.3	0	333	....	....
Marbletown	3,511	2	....	1	....	0	....	....	....
Rosendale	6,278	5	....	1	20.0	1	....	....	....
Esopus	4,907	7	....	1	14.2	1	....	....	....
Saugerties	3,700	1	....	0	....	0	....	....	....
POUGHKEEPSIE	24,029	34	16.4	9	26.5	10	147	....	....
Fishkill	13,016	13	12.0	1	16.5	4	165	....	1
Wappingers Falls	3,504	6	....	2	33.3	1	166	....	....
NEWBURGH	25,000	41	....	8	....	9	....	....	1
Port Jervis	9,385	13	....	1	16.5	2	230	....	1
MIDDLETOWN	14,522	18	15.0	3	16.6	8	55	....	1
Warwick	6,403	2	....	1	50.0	0	....	....	....
Goshen	4,564	6	....	0	....	2	166	....	1

STATE DEPARTMENT OF HEALTH

ts, cities, villages and towns during January, 1902

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tic Diseases						Other Causes of Death										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
118	109	21	40	224	161	1,672	653	68	304	583	639	539	207	305	120	818
115	106	20	40	210	153	1,604	613	65	275	551	595	484	180	282	103	773
65	68	13	24	104	112	917	301	35	147	298	351	261	97	187	45	452
17	19	...	5	18	1	93	111	3	17	24	31	31	19	12	4	37
32	19	6	10	79	35	516	179	20	94	202	185	168	58	63	45	251
...	...	...	1	6	4	52	15	6	10	18	17	18	3	13	6	29
1	...	1	...	3	1	26	7	1	7	9	11	6	3	7	3	4
...	...	...	...	1	...	5	1	...	4	2	3	6	2	3	...	3
...	...	...	...	...	...	3	2	...	...	2	4	1	3	...	...	1
...	2	...	...	...	...	4	...	...	2	2	4	...	...	...	2	1
...	...	...	...	1	...	...	...	...	1	1	2	1	1	1	1	2
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...	...	...	...	4	4	17	4	1	3	8	7	15	3	2	...	3
...	...	...	...	2	...	3	2	...	2	...	2	...	1	...	1	3
1	1	...	...	1	...	5	2	...	3	...	...	...	1	2	1	3
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2	...	...	...	3	3	17	18	2	6	13	15	21	12	4	7	12
3	1	3	3	27	5	139	93	7	74	72	139	113	44	32	55	78
...	...	...	...	3	1	18	20	...	11	19	36	9	6	5	5	5
...	...	1	...	...	...	4	5	...	5	4	4	1	1	2	1	4
...	...	...	1	2	...	15	16	2	9	5	9	15	6	...	1	15
...	...	...	...	...	1	3	1	1	4	1	5	3	...	...	1	3
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1	...	...	...	1	...	9	4	...	4	4	3	3	5	2	1	3
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MONTHLY BULLI

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
HUDSON VALLEY DIS.—(*Con.*)								
Montgomery	5,939	8	....	1	12.5	3	250	....
Haverstraw	9,874	20	....	5	25.0	4	50	....
Nyack	4,275	6	....	2	33.3	3	166	....
Ramapo	7,502	12	....	1	8.3	4	83	....
Rest of district	268,970	343	15.2	44	13.0	122	60	....
ADIRONDACK AND NORTH'N DISTRICT Totals	394,772	383	12.0	76	20.0	116	80	4
WATERTOWN	21,700	23	12.5	3	13.0	9	....	....
Ellisburg	3,888	8	....	1	12.5	3	....	....
Cape Vincent	2,882	6	....	1	16.6	3	....	....
Clayton	4,313	1	....	1	....	0	....	....
OGDENSBURG	12,633	20	18.5	2	10.0	4	....	....
Gouverneur	6,000	6	....	3	50.0	1	....	....
Potsdam	3,843	6	....	0	....	2	....	....
Canton	6,387	5	....	1	20.0	2	200	....
Malone	5,935	7	....	1	14.2	0	142	....
Plattsburgh	8,434	13	....	3	23.0	3	230	....
Glens Falls	12,613	18	17.0	4	22.2	5	55	....
Whitehall	4,377	6	....	4	66.6	1	500	....
Fort Edward	5,216	12	....	5	41.6	3	83	....
Sandy Hill	4,473	8	....	1	12.5	2	125	....
Granville	5,217	6	....	1	16.7	2	167	....
Greenwich	4,172	9	....	2	22.2	2	....	....
Lowville	3,746	8	....	0	....	6	125	1
Rest of district	278,984	221	10.0	43	20.0	68	75	3
MOHAWK VALLEY DISTRICT Totals	408,973	533	15.5	86	16.0	159	51	2
SCHENECTADY	31,682	47	17.0	16	34.0	4	64	....
Cobleskill	3,973	8	....	0	....	2	125	....
AMSTERDAM	20,929	27	15.5	6	22.2	6	34	....
Fort Plain	2,444	6	....	....	....	3	....	....
JOHNSTOWN	10,130	10	....	1	10.0	3	....	....
GLOVERSVILLE	18,349	29	18.5	3	....	6	....	....
LITTLE FALLS	10,381	4	....	1	....	1	....	....
Herkimer	5,555	7	....	1	14.2	3	....	....
Ilion	5,138	8	....	3	37.5	1	125	1
UTICA	56,383	69	14.5	15	21.6	16	115	....
Whitestown	6,235	4	....	0	....	3	....	....
ROME	15,343	22	17.0	3	13.6	8	....	....
Boonville	3,332	1	....	0	....	0	....	....
Camden	3,745	3	....	0	....	2	....	....
Waterford	6,157	5	....	0	....	0	....	....
Mechanicville	4,695	6	....	0	....	1	....	....
Ballston Spa	3,923	8	....	2	25.0	1	....	....
Saratoga Springs	12,409	30	....	4	13.3	8	....	....
Rest of District	188,170	239	15.0	31	13.0	91	45	1
SOUTHERN TIER DISTRICT Totals	429,530	548	13.0	94	17.0	179	100	3
BINGHAMTON	39,647	75	22.0	16	21.3	14	160	....
Owego	5,039	9	....	1	11.1	3	111	....
Candor	3,330	2	....	0	....	1	....	....
Waverly	4,465	4	....	0	....	3	250	....
ELMIRA	35,672	39	13.0	7	18.0	7	50	....

R JANUARY—(*Continued*)

YMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	2	...	1	1	...	...	1	...	2	...	...	1	...
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...	2	...	1	1	7	2	47	29	2	25	23	56	56	16	16	28	25
...	5	2	2	1	7	4	51	42	5	30	14	43	53	11	15	35	48
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...	5	2	1	...	1	1	35	23	3	19	9	16	27	7	14	21	30
...	1	1	...	1	9	...	75	52	2	40	26	73	86	23	24	42	63
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...	...	...	...	...	...	...	3	3	...	1	1	5	6	1	...	2	4
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...	...	...	...	...	...	...	3	...	...	...	1	1	...	...	...	...	2
...	1	1	...	1	2	...	15	10	...	4	4	10	6	1	...	3	8
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...		...	...	...	...	...	2	5	...	2	3	4	4		3	2	5
...	...	...	...	...	4	...	29	22	2	23	12	34	37	7	9	23	21
1	4	4	6	3	19	5	87	37	5	35	45	69	58	22	24	53	59
1	3	1	1	1	2	1	12	8	...	4	10	5	12		2	3	7
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...	...	...	...	...	1	1	5	6	...	1	8	3	2		5	1	3

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
SOUTHERN TIER DIST.—(*Con.*)								
Horseheads	4,944	5	....	2	40.0	1	200	...
HORNELLSVILLE	12,000	18	18.0	4	22.2	3	55	...
Bath	5,000	5	....	1	20.0	2	....	...
CORNING	11,061	20	....	1	5.0	5	50	..
Wellsville	5,000	5	....	1	20.0	2	....	...
OLEAN	9,462	7	....	1	14.2	3	142	1
Salamanca	4,251	4	....	1	25.0	0	....	...
DUNKIRK	11,616	16	17.0	6	37.5	2	137	...
JAMESTOWN	22,892	22	12.0	7	31.7	4	90	...
Westfield	2,430	7	....	3	42.8	3	142	..
Fredonia	4,125	14	....	5	35.7	3	428	...
Rest of district	248,594	296	14.5	40	13.5	123	75	2
EAST CENTRAL DISTRICT Totals	402,660	464	14.5	63	13.5	155	44	1
SYRACUSE	108,374	134	14.5	15	11.2	32	45	1
Baldwinsville	3,000	1	....	0	....	1	....	...
De Witt	5,435	5	....	4	80.0	0	....	...
CORTLAND	9,014	12	....	2	16.6	5	166	..
Homer	2,381	5	....	1	20.0	2	....	...
ONEIDA	7,942	12	....	0	....	4	166	..
Hamilton	3,744	3	....	1	33.3	1	....	...
Casenovia	3,830	....	....	....	....	....	....	...
Brookfield	2,726	2	....	1	50.0	1	....	...
Norwich	5,766	11	....	1	9.0	3	....	...
Oneonta	7,147	12	....	2	16.6	3	83	..
Worcester	2,409	1	....	0	....	0	....	...
Cooperstown	2,368	4	....	1	25.0	0	....	...
Walton	4,869	....	....	....	....	....	....	...
Delhi	3,243	4	....	0	....	2	....	...
Liberty	4,568	4	....	0	....	1	....	...
Rest of district	225,844	254	13.6	35	14.0	100	40	..
WEST CENTRAL DISTRICT Totals	316,000	410	15.0	42	10.0	159	63	1
AUBURN	30,345	48	18.5	7	14.5	17	82	...
ITHACA	13,136	19	....	3	15.8	8	....	...
Hector	4,137	3	....	1	33.3	2	....	...
Waterloo	4,256	7	....	1	12.5	4	....	...
Seneca Falls	6,519	6	....	0	....	1	....	...
GENEVA	10,433	19	....	6	32.0	2	....	...
Canandaigua	6,151	6	....	1	16.7	1	166	...
Manchester	4,733	11	....	1	9.0	3	273	..
Phelps	4,788	3	....	0	....	1	....	...
Penn Yan	4,650	6	....	1	16.7	4	166	...
Batavia	9,180	7	....	3	42.5	0	142	..
Dansville	3,633	5	....	0	....	4	....	...
Le Roy	3,144	6	....	1	16.6	1	166	...
Warsaw	4,341	4	....	0	....	2	....	...
Rest of district	206,500	260	15.2	17	6.5	109	70	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	996	14.0	205	20.0	232	90	12
BUFFALO	352,387	381	13.0	107	28.0	52	126	5
Tonawanda	7,421	10	....	4	40.0	2	100	...
Amherst	4,223	5	....	0	....	2	....	...
NORTH TONAWANDA	9,069	8	....	4	50.0	1	....	...
LOCKPORT	16,581	18	13.0	3	17.7	6	59	.

FOR JANUARY — (*Continued*)

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	**Acute respiratory diseases**	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	**Diseases of circulatory system**	Diseases of nervous system	Cancer	Accidents and violence	**Old age**	Unclassified
						1					1	1	1					1
					1			5	1		3	1	1	2	1	2		1
								1					1				1	2
						1		8	4			2		1		2	2	
								1					2				2	
								1	1				1	1			1	1
									1						1	1		1
			1			1		1			5	1	2				1	3
				1		1			2	1		1	2	2		1	2	8
			1									2	2				1	1
						6		4					1	2			1	
1		1	1	3	1	6	3	49	13	4	21	18	46	36	13	9	35	30
		4	1	1	2	6		51	41	2	54	26	72	58	26	19	40	53
		3		1		1		10	15		14	10	26	14	11	5	11	12
														1				
									1		1							3
						1		1			1	1	3		1		2	2
											3			1			1	
						2		1	2		1		1	2		1	2	
											1					2		
													1					1
								3			2		1	2	1			2
								2	1				2			1	1	4
													1					
									1		2			1				
											1				1		1	1
									1					1			1	
		1	1		2	2		34	20	2	28	15	37	36	12	10	21	28
	1	2	1	3	3	6	4	64	26		35	19	73	62	18	14	35	38
				1	1	1	1	8	1		7	2	9	4	1		5	7
								2	1		2		5	3	2	1	1	2
														1				2
									2		2		1	1			1	
								2	1		1	1				1		
								1	1		3	2	1	3		1	1	6
								1	2					2				
									1		1		5	2				2
														1	2			
		1										1	2				2	
					1			1			1	1		2				1
									1				1				3	
						1		3					1			1		
									2				1	1				
	1	1	1	2	1	4	3	46	14		18	12	47	42	13	10	22	18
1	1	4	13	6	5	22	9	132	94	10	73	68	126	134	30	67	68	103
1	1	3	11	2	2	14	5	53	38	7	28	22	24	57	8	36	21	39
							1		1		2	1		2	1	2		
								1					1				1	2
													2	1			1	4
						1		1			2		5	4		1	1	3

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NIAGARA FALLS	19,457	20	13.0	6	30.0	2	300		
Medina	4,716	3	.....	1	33.3	0	.....		
Albion	4,477	11	.....	2	18.2	3	182		
Brockport	3,400	4	.....	0	.....	2	.....		
ROCHESTER	162,608	179	13.0	29	17.0	31	110		5
Palmyra	3,758	5	.....	1	20.0	1	200		
Newark	4,578	6	.....	1	16.7	2	.....		
Lyons	5,824	12	.....	2	16.7	4	.....		
Clyde	2,507	5	.....	1	20.0	2	200		1
OSWEGO	22,200	29	15.5	5	17.0	6	70	1	
Fulton	5,281	6	.....	1	16.6	2	.....		
Richland	3,535	5	.....	0	.....	2	200	1	
Rest of district	244,184	289	14.5	38	13.1	112	40		5
Totals for the state	7,467,050	10,968	17.3	2,933	26.8	2,015	103	48	146
Average for past 5 years	....	10,945	18.6	2,605	23.7	.....	90	39	135

REMARKS—At the beginning of the year smallpox existed at **Buffalo**, *Binghamton*, Watertown, Plattsburg and at certain lumber camps in the Adirondack region. At Buffalo an extensive outbreak commenced during the fall in a circumscribed part of the city and to the end of the year there had been received at the State Department reports of 155 cases; since then 144 cases have been reported making a total of 399 for the outbreak there from the commencement to the time of this writing at the end of February of this year. A diminished number of new cases are now being reported. At Binghamton a case was imported from a neighboring State in December and further spread has continued through January and February, the exact number not being yet reported, but perhaps 25 or 30 cases in all have occurred. One case originating there has developed in the nearby town of Chenango, recently. In Plattsburg a case originating from Burlington, Vt., in December, was followed by an extensive spread of the disease, 22 cases occurring in December, 55 in January and 12 in February, in all 84 having been reported from this outbreak. At Champlain there are now 8 cases in two households which may have come from Plattsburg. At Watertown, where an extensive outbreak occurred a year ago, there having been then 62 cases in the city and vicinity, there has been a recurrence of the disease commencing near the close of last year and which still continues, the total census of it not having yet been reported to this Department. Cases from these occurred in the neighboring towns of Brownville, La Fargeville and Le Roy where 11 cases occurred during January. In all these localities the care of the outbreak has been fairly well in hand and there is at this time but little probability of spread abroad and while they have been severe they are now under control and subsiding. Greater interest however has developed in the occurrence of the disease in the Adirondack region of the northern part of the State and particularly among the numerous lumber camps. The work of lumbering attracts many from the neighboring Province of Ontario where smallpox has been reported as being wide-spread, and they move from place to place more readily than a fixed population, the camps themselves being remote from observation.

In the town of Waverly, near St. Regis Falls, cases developed in November from infection brought from Canada and there have been 10 cases, for the most part in one family, to the last of February.

In December 6 cases developed in lumber camps in the town of Webb, which originated from Canada. Two of these cases went to Utica by train, where they all were quarantined and all exposed persons vaccinated.

In the town of Altamont, Franklin county, there are numerous lumber camps in which smallpox developed in December. Tupper Lake in this town is a central point in the Adirondacks and one to which men largely come seeking employment in the camps. In this way it has become the recipient of numerous cases of smallpox, 15 or 20 in number, some of which continue to exist at the present time. A large burden has thus been imposed upon this town

FOR JANUARY —(*Concluded*)

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	2	...	3	1	...	2	1	1	......	...	1	1	4
...	...	...	...	...	...	...	...	1	...	...	...	1	1	......	...	...	...	...
...	...	...	...	...	1	...	...	1	2	...	...	1	4	1	...	...	...	1
...	...	...	...	...	...	...	...	...	1	...	...	1	1	......	...	1	...	...
...	...	1	1	4	1	3	1	24	19	1	14	12	24	19	9	13	11	15
...	...	...	...	...	...	...	...	...	...	...	1	...	1	......	1	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	...	...	1	1
...	...	...	...	...	...	...	...	2	3	...	...	...	1	......	1	2	2	1
...	...	...	...	...	...	...	...	...	...	...	...	...	2	......	...	1	...	1
...	...	...	...	...	...	1	...	2	6	...	3	1	7	4	1	1	1	1
...	...	...	...	...	...	...	...	1	...	...	1	1	2	1	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	2	1	...	......	...	...	1	...
...	...	...	1	...	1	1	2	43	23	2	18	26	47	44	9	9	28	30
16	39	141	132	42	58	320	188	2,274	1,038	99	645	853	1,234	1,103	384	500	448	1,260
19	2	91	89	34	63	350	129	2,269	1,175	94	657	786	1,035	1,157	368	448	599	1,406

in the maintenance of a hospital for their care. There has, however, been but little spread from this centre. Very general vaccination has been secured in the camps in this vicinity. At Old Forge not far distant, in Herkimer county, three have been 3 cases and at Long Lake 1 or more. Saranac Lake and the town of Harrietstown have 2 cases, originating at Plattsburg. A case of smallpox arrested in Norwood, St. Lawrence county, had traversed the public highway for three days, from whom cases have developed along his route, at Childwold, in the town of Colton, at Potsdam and at Crogan, all in this region, in all 7 cases. There have been during those two months of the year outbreaks at fourteen or fifteen places, in this part of the State, in some but a single case and about 50 cases in all. The State Department of Health has an inspector in this region. Very much has been done to control the spread by vaccination and by arresting traveling cases. Few new cases have been reported during the last week or ten days of the month of February and it is hoped that there will not be a prolonged continuance of smallpox in this region. It is, however, the chief centre of interest at the present time.

In the southwestern counties, Steuben and Allegany, there has been an importation of smallpox, from the adjoining State of Pennsylvania, to the towns of Canisteo, Greenwood, Almond and Ossian, 10 cases in all thus far, and recently a case has come to Lodi, in Seneca county, and one to Geneva, both from undiscovered sources. There is also a case at Middletown coming from Weehawken. At Mount Vernon, New Rochelle, Southold and Clarkstown there are 9 cases, originating in the nearby metropolis; recently 1 in Albany directly imported from New Jersey, and three in one family at Rochester.

There are at this time 34 cases at twelve points in the Adirondacks; 8 cases at five points in the southwest region of the State; at Binghamton and Plattsburg each probably 12 cases; and at four or five scattered localities single imported cases, making 70 cases in the State, not including Buffalo where reports indicate now about 30 cases. There are 100 cases of smallpox now in the State at twenty-five localities outside of New York city. Of the 39 deaths, 35 occurred in New York city, and 1 each at Buffalo, Binghamton, Ossian and Mount Vernon.

Grippe caused probably 1500 deaths, the average of the past five years in this month; the mortality from all causes and from acute respiratory diseases being just that of the average for that period. It probably caused about half as many in December when the current epidemic commenced, viz., 750 deaths.

Pneumonia is reported as causing 1334 deaths, or 60 per cent of the deaths from acute respiratory diseases. Bright's disease (New York city not included) caused 224 deaths, of 276 reported as from diseases of the urinary system.

Scarlet fever and measles exceed the average, but chiefly of the Maritime district; other zymotic diseases, save smallpox, are at the normal.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT Totals	3,948,946	6,475	21.3	2,188	33.5	683	125	32	23
CITY OF NEW YORK Totals	3,632,501	6,065	21.7	2,081	34.3	606	129	31	22
BOROUGH OF MANHATTAN	1,895,491	3,300	22.5	1,183	36.0	282	122	23	10
BOROUGH OF THE BRONX	244,141	478	25.5	158	33.3	44	235	2	....
BOROUGH OF BROOKLYN	1,249,650	1,967	21.5	656	33.5	243	123	6	12
BOROUGH OF QUEENS	172,472	217	16.4	62	28.5	18	74	....	....
BOROUGH OF RICHMOND	70,747	103	19.0	22	22.0	19	50	....	....
Oyster Bay	16,334	1	.....	0	.....	1	....	....	....
Hempstead	27,066	28	13.0	8	28.5	7	70	....	....
North Hempstead	12,048	11	.....	3	27.3	2	90	....	....
Southold	8,301	6	.....	2	.....	2	....	....	....
Sag Harbor	2,000	3	.....	1	33.3	0	....	....	....
Huntington	9,483	11	.....	1	9.0	2	....	....	....
Brookhaven	14,592	16	.....	4	25.0	4	125	....	....
YONKERS	47,931	69	18.0	23	33.0	13	58	....	....
Greenburg	15,564	19	.....	4	21.0	4	....	....	....
MOUNT VERNON	20,346	34	23.0	4	11.8	6	60	....	....
Port Chester	7,440	11	.....	4	36.4	1	270	....	1
Ossining	7,939	12	.....	5	41.5	4	....	....	....
NEW ROCHELLE	14,720	18	.....	5	27.7	1	165	1	....
Peekskill	10,358	23	.....	4	17.3	7	....	....	....
White Plains	7,900	7	.....	5	71.3	0	....	....	....
Rest of district	94,383	141	19.0	34	24.3	23	50	....	....
HUDSON VALLEY DISTRICT Totals	690,000	1,002	18.7	175	17.7	230	81	2	29
ALBANY	94,151	148	20.3	19	13.0	25	53	....	3
COHOES	24,000	46	25.0	7	15.2	3	200	....	8
TROY	75,057	135	23.3	33	24.5	16	175	1	4
WATERVLIET	14,321	11	.....	4	35.3	2	175	....	2
Green Island	4,770	6	.....	0	.....	1	....	....	....
Hoosick Falls	5,671	13	.....	2	15.4	2	75	....	....
RENSSELAER	10,000	8	.....	3	37.5	1	125	....	....
Coxsackie	4,102	5	.....	1	20.0	3	....	....	....
Catskill	5,486	7	.....	0	.....	4	142	....	1
HUDSON	9,528	18	22.5	5	27.7	3	55	....	1
KINGSTON	24,535	36	.....	8	22.2	6	83	1	....
Ellenville	3,000	4	.....	1	25.0	1	250	....	....
Marbletown	3,511	5	.....	1	20.0	2	....	....	....
Rosendale	6,278	6	.....	1	16.7	0	....	....	....
Esopus	4,907	12	.....	4	33.3	1	83	....	1
Saugerties	3,700	6	.....	4	66.6	2	....	....	....
POUGHKEEPSIE	24,029	44	22.5	7	15.7	13	90	....	1
Fishkill	13,016	22	.....	6	27.3	5	....	....	....
Wappinger Falls	3,504	5	.....	0	.....	0	....	....	....
NEWBURGH	25,000	44	23.0	15	34.1	7	250	....	1
Port Jervis	9,385	10	.....	2	20.0	2	....	....	....
MIDDLETOWN	14,522	16	13.0	2	12.5	2	....	....	....
Warwick	6,103	7	.....	0	.....	3	....	....	....
Goshen	4,564	8	.....	1	12.5	2	125	....	....

RK STATE DEPARTMENT OF HEALTH

tricts, cities, villages and towns during February, 1902

ages in *italic* and towns in Roman type.]

MOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
48	130	144	30	50	204	136	1,588	707	60	263	548	603	545	192	281	103	779
48	129	140	29	47	197	129	1,507	666	56	240	515	554	484	177	252	86	747
6	57	69	22	34	115	69	807	327	33	153	264	308	263	95	165	38	439
33	25	34	1	3	4	7	88	103	3	7	32	27	33	5	15	3	51
8	45	37	6	9	69	46	519	200	17	67	194	185	155	67	56	38	228
...	2	...	...	1	6	6	70	21	3	6	13	25	20	7	11	5	20
1	...	...	...	...	3	1	23	15	..	7	12	9	13	3	5	2	9
...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
...	...	1	...	1	...	...	8	2	...	1	4	4	3	1	1	1	1
...	...	1	...	...	...	...	4	1	...	...	...	2	2	...	...	1	...
...	...	...	...	...	...	...	1	...	...	...	1	1	...	...	...	1	2
...	...	...	...	...	...	...	1	1	...	...	...	...	...	1	...	...	...
...	...	...	...	...	...	...	2	...	...	1	2	...	3	3	...	...	...
...	...	1	...	1	...	...	1	4	...	1	...	1	3	1	...	2	1
...	...	...	...	...	2	2	18	7	3	5	5	7	7	1	5	3	4
...	...	...	...	...	...	...	2	4	...	...	2	5	2	1	...	...	3
...	1	1	...	...	...	...	5	3	1	1	6	3	4	...	5	2	2
...	...	...	1	...	1	...	1	...	...	1	1	3	2	...	...	...	...
...	...	...	...	...	...	...	6	...	...	...	...	1	4	...	...	...	1
...	...	...	...	1	1	...	2	...	...	2	2	3	1	1	3	...	1
...	...	...	...	...	...	...	4	5	...	3	...	3	3	...	1	2	2
...	...	...	...	...	1	...	4	...	...	...	...	...	1	...	...	...	1
...	...	...	...	...	2	5	21	14	...	8	10	16	26	6	14	5	14
	13	2	...	8	13	11	156	128	12	71	65	132	133	38	35	56	95
	...	...	...	...	2	3	25	16	3	11	15	38	6	8	6	6	6
	...	...	...	1	...	...	4	4	...	2	3	3	8	3	3	2	5
	1	...	...	...	1	1	32	21	1	9	11	15	12	3	4	4	15
	...	...	...	...	...	...	2	...	...	...	1	1	2	1	...	...	2
	...	...	...	...	...	...	1	1	...	...	...	1	1	...	1	...	1
	...	...	...	...	1	...	3	2	...	1	3	1	...	1	...	...	1
	...	...	...	...	...	1	4	1	...	1	...	1	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	1	1
	...	...	...	...	...	...	1	1	...	...	2	1	1	...	...	...	...
	...	...	...	...	...	...	1	...	...	1	...	3	7	2	1	...	2
	...	...	...	...	1	1	4	4	1	4	1	4	4	2	2	4	3
	...	...	...	...	1	...	3	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	2	...
	...	...	...	...	...	...	...	2	...	2	...	...	1	...	...	...	1
	...	...	...	...	...	...	3	2	...	1	...	...	2	...	...	...	3
	...	...	...	...	...	...	1	...	...	...	...	...	3	...	...	...	2
	...	...	...	2	1	...	10	8	2	1	1	3	7	1	...	3	1
	...	...	...	...	...	...	2	3	1	4	1	1	1	...	1	2	6
	...	...	...	...	...	...	1	1	...	...	...	1	1	...	...	...	1
	...	...	...	...	...	1	9	5	...	2	...	3	3	...	3	1	7
	...	...	...	...	...	...	2	...	...	1	...	4	1	1	...	...	1
	...	...	...	...	...	...	...	4	...	2	1	1	3	...	2	1	2
	...	...	...	...	...	...	...	2	1	1	...	1	1	...	1	...	...
	...	...	...	1	...	...	2	2	...	...	...	1	1	...	...	1	...

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIST. (*Con.*)									
Montgomery	5,939	7	.....	2	25.0	3	....	....	....
Haverstraw	9,874	6	.....	1	16.6	1	....	....	....
Nyack	4,275	7	.....	0	.....	0	....	....	....
Ramapo	7,502	15	.....	4	26.7	7	200	....	....
Rest of district	268,970	345	16.5	42	12.4	113	75	....	7
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	454	15.0	78	17.0	152	60	1	9
WATERTOWN	21,700	35	21.0	7	20.0	11	85	....	2
Ellisburg	3,888	5	.....	1	20.0	4	....	....	....
Cape Vincent	2,882	1	.....	0	.....	1	....	....	....
Clayton	4,313	7	.....	3	42.8	1	....	....	....
OGDENSBURG	12,633	16	15.5	2	12.5	6	....	....	....
Gouverneur	6,000	7	.....	1	14.2	5	....	....	....
Potsdam	3,843	13	.....	1	7.5	1	75	....	....
Canton	6,387	11	.....	1	9.0	4	90	....	....
Malone	5,935	.....	.....	.....	.....	.....	....	....	....
Plattsburg	8,434	5	.....	1	20.0	0	200	....	....
Glens Falls	12,613	15	.....	1	7.0	4	70	....	....
Whitehall	4,377	6	.....	2	33.3	2	....	....	....
Fort Edward	5,216	6	.....	1	16 6	3	....	....	....
Sandy Hill	4,473	9	.....	3	33.3	2	....	....	....
Granville	5,217	9	.....	0	.....	5	....	....	....
Greenwich	4,172	9	.....	1	11.1	0	111	....	1
Lowville	3,746	4	.....	2	50.0	1	250	1	....
Rest of district	278,984	296	13.7	51	17.0	102	65	....	6
MOHAWK VALLEY DISTRICT Totals	408,973	448	14.5	89	20.0	127	65	2	7
SCHENECTADY	31,682	35	14.5	11	31.4	5	86	....	1
Cobleskill	3,973	7	.....	2	28.5	1	....	....	....
AMSTERDAM	20,929	11	.....	4	.....	1	....	....	....
Fort Plain	2,444	.....	.....	.....	.....	.....	....	....	....
JOHNSTOWN	10,130	12	.....	4	33.3	3	84	....	....
GLOVERSVILLE	18,349	20	13.3	2	10.0	5	50	....	....
LITTLE FALLS	10,381	11	.....	2	18.2	4	91	....	....
Herkimer	5,555	5	.....	1	20.0	1	....	....	....
Ilion	5,138	4	.....	1	25.0	0	250	....	....
UTICA	56,383	92	21.0	18	19.5	15	80	1	2
Whitestown	6,235	8	.....	0	.....	1	250	....	1
ROME	15,343	23	18.0	3	13.0	11	42	....	1
Boonville	3,332	5	.....	1	20.0	3	....	....	....
Camden	3,745	4	.....	0	.....	3	....	....	....
Waterford	6,157	13	.....	3	23.0	5	76	....	....
Mechanicville	4,695	7	.....	3	42.8	0	142	....	....
Ballston Spa	3,923	3	.....	0	.....	1	....	....	....
Saratoga Springs	12,409	12	.....	0	.....	7	....	....	....
Rest of district	188,170	175	12.0	34	20.0	61	80	1	2
SOUTHERN TIER DISTRICT Totals	429,530	513	15.5	77	15.0	173	100	2	7
BINGHAMTON	39,647	60	20.0	11	18.3	10	133	....	1
Owego	5,039	5	.....	0	.....	2	....	....	....
Candor	3,330	2	.....	0	.....	0	....	....	....
Waverly	4,465	8	.....	1	12.5	1	....	....	....
ELMIRA	35,672	32	12.0	5	15.5	6	97	....	

R FEBRUARY —(*Continued*)

YMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	2	1	...	...	...	...	1	...	...	1	2
...	...	...	...	...	...	...	...	2	...	...	1	1	...	...	...	...	2
...	...	...	...	...	...	...	1	1	...	1	...	2	1	1	...	...	...
...	...	...	...	3	...	...	...	...	...	...	2	1	4	...	2	...	3
1	3	2	...	1	6	4	42	43	3	24	23	42	62	15	9	28	28
...	4	1	1	3	3	4	71	45	1	34	31	54	71	22	14	37	46
...	...	...	...	...	...	1	8	1	...	1	3	4	5	3	1	1	5
...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	1
...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
...	...	...	...	...	...	...	2	...	...	...	...	...	4	...	...	...	1
...	...	...	...	...	...	...	...	2	...	2	2	2	2	2	...	1	3
...	...	...	...	...	...	...	1	...	...	...	...	1	1	...	...	4	...
...	...	...	...	...	1	...	1	5	...	1	...	3	1	...	1	...	...
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...	...	...	...	...	...	...	5	1	...	4	...	2	...	1	...	1	...
...	...	...	...	...	...	...	1	...	...	1	...	2	1	...	...	...	1
...	...	...	...	...	...	...	1	...	...	1	1	...	...	...	...	2	1
...	...	...	...	...	...	...	3	1	...	...	1	...	4	...	...	...	...
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...	...	...	...	...	...	...	5	1	...	...	...	...	...	1	...	...	1
...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	1
...	4	1	1	2	1	3	42	29	...	22	21	36	45	12	11	27	32
...	3	1	..	1	13	2	76	36	2	30	27	52	71	17	21	38	49
...	...	...	...	...	1	1	5	8	...	2	1	3	7	...	...	1	5
...	...	...	...	...	...	...	2	...	...	...	...	1	2	1	...	...	1
...	...	...	...	...	...	...	3	...	...	1	...	...	5	...	...	...	2
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...	...	...	...	...	1	...	1	1	...	1	3	2	6	1	2	1	1
...	1	...	...	...	...	...	1	...	...	1	...	...	4	...	1	2	1
...	...	...	...	...	...	...	2	...	1	...	...	...	1	...	...	...	1
.	...	...	...	...	1	...	...	1	...	...	...	...	2	...	...	...	...
...	2	1	...	...	1	...	24	6	1	7	9	8	8	3	7	5	7
...	...	...	...	...	1	...	1	3	...	1	...	...	...	1	...	...	...
...	...	...	...	...	...	...	2	3	...	2	1	3	4	...	...	4	3
...	...	...	...	...	...	...	...	1	...	...	...	1	2	...	...	1	...
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...	...	...	...	...	1	...	4	1	...	2	...	1	3	...	...	1	...
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...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...
...	...	...	...	...	...	...	3	1	...	1	1	2	3	1	...	...	...
...	...	...	...	1	6	...	25	11	...	11	9	26	22	10	9	18	24
2	6	8	2	3	12	7	73	25	4	40	27	83	86	21	23	45	36
2	3	...	1	...	1	...	7	6	2	6	2	4	12	2	6	3	2
...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	.
...	...	...	...	...	...	...	2	...	...	2	1	1	...	1	1	...	.
...	...	...	...	1	1	...	6	...	...	...	3	3	7	1	2	...	7

MONTHLY BULL

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
SOUTHERN TIER DIST.—(*Con.*)								
Horseheads	4,944	2	....	0	....	2	....	...
HORNELLSVILLE	12,000	11	12.0	1	9.0	1	....	...
Bath	5,000	6	....	1	16.7	2	167	...
CORNING	11,061	13	15.0	3	23.0	2	230	...
Wellsville	5,000	10	....	0	....	2	....	...
OLEAN	9,462	10	....	1	10.0	3	100	...
Salamanca	4,251	4	....	2	50.0	1	500	...
DUNKIRK	11,616	18	20.0	8	44.4	2	378	...
JAMESTOWN	22,892	16	11.0	2	12.5	6	62	...
Westfield	2,430	3	....	0	....	2	333	...
Fredonia	4,125	4	....	0	....	2	....	...
Rest of district	248,591	309	16.0	42	13.0	129	80	2
EAST CENTRAL DISTRICT Totals	402,660	451	15.0	61	13.5	144	22	1
SYRACUSE	108,374	106	12.7	17	15.0	19	38	...
Baldwinsville	3,000	6	....	0	....	1	....	...
De Witt	5,435	9	....	3	53.3	5	....	...
CORTLAND	9,014	8	....	2	25.0	1	....	...
Homer	2,381	3	....	0	....	2	....	...
ONEIDA	7,942	9	....	2	22.2	2	....	...
Hamilton	3,744	7	....	0	....	5	....	...
Cazenovia	3,830	11	....	0	....	5	....	...
Brookfield	2,726	3	....	0	....	1	....	...
Norwich	5,766	13	....	3	23.0	4	....	
Oneonta	7,147	12	....	0	....	2	82	...
Worcester	2,409	7	....	1	14.2	3	....	...
Cooperstown	2,368	1	....	0	....	0	....	...
Walton	4,869	3	....	1	33.3	1	....	...
Delhi	3,243	4	....	0	....	2	....	...
Liberty	4,568	8	....	2	25.0	1	125	..
Rest of district	225,844	241	14.0	30	12.5	90	165	1
WEST CENTRAL DISTRICT Totals	316,000	381	15.3	40	10.7	142	35	..
AUBURN	30,345	35	15.0	2	5.5	10	26	...
ITHACA	13,136	12	12.0	0	....	4	....	...
Hector	4,137	4	....	0	....	0	....	...
Waterloo	4,256	10	....	1	10.0	1	....	...
Seneca Falls	6,519	12	....	0	....	4	....	...
GENEVA	10,433	12	14.0	4	33.3	1	83	...
Canandaigua	6,151	8	....	1	12.5	3	125	...
Manchester	4,733	8	....	2	25.0	3	....	
Phelps	4,788	13	....	3	23.0	5	....	...
Penn Yan	4,650	5	....	1	20.0	1	....	...
Batavia	9,180	5	....	0	....	4	....	...
Dansville	3,633	5	....	0	....	2	....	...
Le Roy	3,144	5	....	0	....	1	....	..
Warsaw	4,341	6	....	0	....	2	....	..
Rest of district	206,500	241	15.0	26	11.0	101	41	
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	946	14.0	182	20.0	253	70	7
BUFFALO	352,387	379	13.6	101	26.4	68	110	2
Tonawanda	7,421	10	....	2	20.0	2	....	.
Amherst	4,223	2	....	0	....	2	....	...
NORTH TONAWANDA	9,069	6	....	0	....	0	....	...
LOCKPORT	16,581	14	....	4	28.5	3	....	...

: FEBRUARY — (*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...
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...	...	...	...	...	2	...	1	2	...	...	3	1	1	...	...	...	2
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...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	1
...	...	4	...	...	...	2	1	1	1	1	2	...	1	...	1	1	2
...	...	...	...	...	...	...	1	...	...	2	2	2	4	...	1	1	2
...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	1	...
...	...	...	...	...	...	...	1	...	...	...	...	2	1	...	...	...	...
...	2	4	1	2	5	5	48	14	1	24	13	60	51	13	12	32	18
...	...	1	...	1	1	3	73	32	6	33	39	57	62	26	24	36	53
...	...	1	...	...	1	2	12	13	1	9	6	12	9	10	6	8	16
...	...	...	...	...	...	...	1	1	...	...	1	1	...	...	2	...	...
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...	...	...	...	...	...	...	1	...	...	1	...	...	5	...	...	1	...
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...	...	...	...	...	...	...	1	...	...	1	1	1	2	...	1	1	1
...	...	...	...	...	...	...	...	1	...	...	1	...	3	...	1	...	1
...	...	...	...	...	...	...	4	...	1	...	...	1	...	...	2	1	2
...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...
...	...	...	...	...	...	...	6	1	...	1	...	3	...	...	1	1	...
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...	...	...	...	...	...	...	...	1	...	1	...	1	1	...	...	2	1
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...	...	...	...	...	...	...	2	...	...	...	...	1	1	...	...	...	...
...	...	...	...	...	...	...	3	...	...	...	...	1	2	...	...	...	1
...	...	...	...	1	...	1	40	15	3	15	26	33	35	14	8	21	27
...	1	2	1	...	1	3	65	28	3	28	17	71	60	16	20	33	28
...	...	...	...	...	...	...	4	2	...	3	1	8	5	4	2	2	3
...	...	...	...	...	...	...	2	3	...	...	2	...	2	...	1	1	1
...	...	...	...	...	...	...	2	...	...	1	...	...	1	...	...	...	...
...	...	...	...	...	...	...	...	...	2	...	...	3	3	...	1	...	1
...	...	...	...	...	...	...	2	2	...	...	...	4	3	...	1	...	...
...	...	...	...	...	...	1	2	1	...	...	...	1	4	...	1	...	2
...	1	...	...	...	...	...	2	1	...	1	...	...	2	...	1	...	...
...	...	...	...	...	...	...	1	1	...	2	...	...	...	...	2	...	2
...	...	...	...	...	...	...	5	...	...	...	...	3	1	...	...	2	2
...	...	...	...	...	...	...	1	1	...	...	...	...	1	...	1	1	...
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...	...	...	...	...	...	...	2	3	...	...	...	...	...	...	...	...	...
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...	...	...	...	...	...	...	2	...	...	1	...	...	...	...	1	...	2
...	...	2	1	...	1	2	39	13	1	18	14	51	36	11	8	26	15
...	5	7	...	6	17	14	139	99	9	59	69	137	133	43	39	64	88
...	2	5	...	1	11	13	58	36	3	21	28	41	55	19	12	19	46
...	...	...	...	...	...	...	2	2	...	1	...	1	1	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
...	...	...	...	...	1	...	1	1	...	...	...	1	...	1	1	...	...
...	...	...	...	...	...	...	4	2	...	1	1	1	1	...	1	1	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NIAGARA FALLS	19,457	26	17.4	9	35.0	3	270	....	2
Medina	4,716	5	....	1	20.0	3	....	....	..
Albion	4,477	6	....	1	16.6	2	....	....	..
Brockport	3,400	2	....	0	....	0	....	....	..
ROCHESTER	162,608	173	13.5	25	14.5	44	30	2	..
Palmyra	3,758	5	....	0	....	5	....	....	..
Newark	4,578	5	....	0	....	2	....	....	..
Lyons	5,824	9	....	0	....	4	....	....	..
Clyde	2,507	4	....	0	....	0	....	....	..
OSWEGO	22,200	20	12.0	1	5.0	8	....	....	..
Fulton	5,281	6	....	0	....	1	....	....	..
Richland	3,535	6	....	1	16.6	3	....	....	..
Rest of district	244,184	268	14.5	37	14.0	102	50	3	2
Totals for the state	7,467,050	10,670	18.6	2,890	27.0	1,903	102	47	9
Average for past five years	....	10,324	19.0	2,683	25.8	2,017	91	48	11

REMARKS—**Grippe has been reported throughout the month from all parts of the state and is estimated to have caused 1500 deaths, the same as in January; the average for the past ten years for the month has been 1200.**

Acute respiratory diseases caused 2240 deaths, 100 in excess of the average. There were 1300 deaths from pneumonia, or 60 per cent of the acute respiratory. Bright's disease caused 236 deaths.

FOR FEBRUARY—(*Concluded*)

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	2	1	...	...	1	1	...	4	...	6	...	2	5	...	1	...	1
...	...	...	...	...	...	...	...	1	...	...	1	2	...	...	...	...	1	...
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...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
...	...	...	...	...	2	1	...	23	18	4	12	20	28	19	15	6	13	10
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...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	1	1	1	...
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...	...	1	1	...	3	3	...	42	27	2	14	15	49	42	5	14	24	21
14	51	162	166	34	72	264	180	2,241	1,100	97	558	823	1,189	1,161	375	457	412	1,174
18	7	102	98	41	68	294	138	2,153	1,123	86	619	770	945	1,127	349	405	552	1,270

Smallpox continues in numerous places in the Adirondack region. An inspector from this Department is on constant service there, the lumber camps forming a complex element in its management, and suppressive measures are being energetically carried out. Except the metropolis there are few other affected localities in the State. In New York city there were 48 deaths, 2 at Binghamton and 1 in Clarkstown, Rockland county.

The weather was severe with heavy snow fall; the precipitation excessive in the eastern part and the temperature generally below the average.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	6,463	19.2	2,148	33.3	653	115	25	30
CITY OF NEW YORK									
Totals	3,632,501	6,010	19.5	2,029	33.7	569	120	24	26
BOROUGH OF MANHATTAN	1,895,491	3,342	20.5	1,179	35.2	262	114	19	17
BOROUGH OF THE BRONX	244,141	426	20.5	157	36.9	23	200	2	....
BOROUGH OF BROOKLYN	1,249,650	1,889	20.7	592	31.5	225	125	3	8
BOROUGH OF QUEENS	172,472	242	21.5	74	31.0	34	82	....	1
BOROUGH OF RICHMOND	70,747	111	18.5	27	24.3	18	36	....	....
Oyster Bay	16,334	6	.....	2	.....	2	....	....	....
Hempstead	27,066	38	16.6	10	26.3	8	78	....	1
North Hempstead	12,048	19	.....	4	21.0	3	52	....	....
Southold	8,301	8	.....	2	25.0	2	....	....	....
Sag Harbor	2,000	1	.....	0	.....	1	....	....	....
Huntington	9,483	7	.....	1	.....	0	....	....	....
Brookhaven	14,592	28	.....	3	10.3	9	70	....	....
YONKERS	47,931	79	18.6	31	39.2	10	50	....	....
Greenburg	15,564	16	.....	6	.....	3	....	1	....
MOUNT VERNON	20,346	21	12.5	3	12.8	6	....	....	....
Port Chester	7,440	7	.....	2	28.5	1	57	....	1
Ossining	7,939	17	.....	5	30.0	4	60	....	1
NEW ROCHELLE	14,720	10	.....	6	.....	1	....	....	....
Peekskill	10,358	22	.....	8	36.3	3	232	....	....
White Plains	7,900	15	.....	2	13.3	1	....	....	....
Rest of district	94,383	159	19.5	34	21.7	30	65	....	1
HUDSON VALLEY DISTRICT									
Totals	690,000	978	16.5	170	17.5	231	65	2	30
ALBANY	94,151	120	15.3	12	10.0	21	35	....	2
COHOES	24,000	33	16.2	6	18.2	1	150	....	5
TROY	75,057	127	20.0	30	23.6	15	80	1	7
WATERVLIET	14,321	21	.....	4	19.0	2	140	....	3
Green Island	4,770	8	.....	3	37.5	1	125	....	....
Hoosick Falls	5,671	6	.....	3	50.0	2	166	1	....
RENSSELAER	10,000	13	.....	3	23.0	2	....	....	....
Coxsackie	4,102	1	.....	0	.....	0	....	....	....
Catskill	5,486	12	.....	5	45.4	5	....	....	....
HUDSON	9,528	20	25.0	4	20.0	1	350	....	6
KINGSTON	24,535	45	21.6	9	20.0	7	45	....	....
Ellenville	3,000	4	.....	2	50.0	1	250	....	....
Marbletown	3,511	4	.....	1	25.0	0	....	....	....
Rosendale	6,278	12	.....	2	16.6	1	....	....	....
Esopus	4,907	9	.....	1	11.1	2	222	....	....
Saugerties	3,700	6	.....	2	33.3	2	....	....	....
POUGHKEEPSIE	24,029	39	19.0	12	30.0	10	150	....	1
Fishkill	13,016	20	.....	3	15.0	3	50	....	....
Wappinger Falls	3,504	9	.....	0	.....	3	....	....	....
NEWBURGH	25,000	44	21.0	10	22.8	7	23	....	....
Port Jervis	9,385	12	.....	0	.....	4	....	....	....
MIDDLETOWN	14,522	20	15.0	1	5.0	5	....	....	....
Warwick	6,403	4	.....	0	.....	2	....	....	....
Goshen	4,564	9	.....	1	11.1	4	....	....	....

YORK STATE DEPARTMENT OF HEALTH

***districts, cities, villages and towns during March,* 1902**

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
13	45	114	107	19	55	181	167	1,325	788	75	267	565	627	527	218	270	98	947
13	44	112	103	19	49	174	158	1,253	736	73	239	526	578	451	208	246	81	897
6	4	58	45	10	26	94	101	682	370	43	149	283	350	264	114	142	31	534
...	24	12	28	...	4	6	7	81	98	3	3	27	24	31	10	18	5	43
6	16	37	29	9	16	67	44	416	228	24	72	184	176	115	72	66	41	260
1	...	4	1	...	3	7	3	48	24	3	13	22	19	22	8	10	3	50
...	...	1	...	...	...	...	3	26	16	...	2	10	9	19	4	10	1	10
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...	...	2	3	...	...	...	4	26	22	...	7	9	23	32	2	5	8	15
2	1	6	2	1	3	9	8	183	105	5	60	75	123	143	35	39	51	95
...	1	...	...	...	...	1	...	21	18	...	4	16	25	9	11	6	4	2
...	...	...	...	...	...	...	...	7	4	...	1	3	5	3	...	3	...	2
...	...	...	...	...	...	...	2	31	14	2	9	6	12	18	3	...	5	17
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths.	Deaths at 70 years and over.	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
HUDSON VALLEY DIS.—(*Con.*)								
Montgomery	5,939	12	....	4	33.3	3	....	....
Haverstraw	9,874	14	....	4	23.8	2	235	....
Nyack	4,275	1	....	0	....	1	....	....
Ramapo	7,502	11	....	2	18.2	5	182	....
Rest of district	268,970	342	15.0	46	13.7	119	40	....
ADIRONDACK & NORTHERN DISTRICT								
Totals	394,772	492	14.0	79	16.5	148	81	4
WATERTOWN	21,700	24	13.5	3	12.5	6	40	....
Ellisburg	3,888	7	....	0	....	4	....	....
Cape Vincent	2,882	2	....	0	....	1	....	....
Clayton	4,313	2	....	0	....	0	....	....
OGDENSBURG	12,633	22	20.0	7	33.0	6	273	3
Gouverneur	6,000	5	....	1	20.0	2	....	....
Potsdam	3,843	....	....	....	....	....	....	....
Canton	6,387	9	....	0	....	3	....	....
Malone	5,935	15	....	6	40.0	1	333	....
Plattsburg	8,434	10	....	2	20.0	1	....	....
Glens Falls	12,613	24	....	4	16.5	4	....	....
Whitehall	4,377	8	....	1	12.5	1	375	....
Fort Edward	5,216	4	....	3	75.0	1	....	....
Sandy Hill	4,473	7	....	1	14.2	1	....	....
Granville	5,217	7	....	1	14.2	1	285	1
Greenwich	4,172	10	....	3	30.0	2	....	....
Lowville	3,746	6	....	1	16.6	1	....	....
Rest of District	278,984	330	13.0	46	15.0	113	75	....
MOHAWK VALLEY DISTRICT								
Totals	408,973	505	15.0	77	15.0	154	54	2
SCHENECTADY	31,682	45	16.0	10	22.2	7	111	....
Cobleskill	3,973	6	....	2	33.3	3	166	....
AMSTERDAM	20,929	28	16.0	7	25.0	6	....	....
Fort Plain	2,444	7	....	0	....	4	....	....
JOHNSTOWN	10,130	12	....	3	25.0	3	166	....
GLOVERSVILLE	18,349	29	....	5	17.2	9	37	....
LITTLE FALLS	10,381	9	....	1	11.1	2	222	....
Herkimer	5,555	....	....	....	....	....	....	....
Ilion	5,138	....	....	....	....	....	....	....
UTICA	56,383	80	16.5	19	23.7	15	62	....
Whitestown	6,235	5	....	2	40.0	0	400	....
ROME	15,343	23	....	2	8.7	9	....	....
Boonville	3,332	....	....	....	....	....	....	....
Camden	3,745	10	....	3	30.0	2	....	....
Waterford	6,157	10	....	0	....	4	....	....
Mechanicville	4,695	3	....	1	33.3	0	....	....
Ballston Spa	3,923	3	....	0	....	1	....	....
Saratoga Springs	12,409	25	....	2	8.0	3	40	....
Rest of district	188,170	210	13.0	20	9.5	86	50	2
SOUTHERN TIER DISTRICT								
Totals	429,530	519	14.5	81	15.6	161	71	2
BINGHAMTON	39,647	66	19.5	16	24.2	11	60	....
Owego	5,039	8	....	1	12.5	3	....	....
Candor	3,330	5	....	0	....	3	....	....
Waverly	4,465	6	....	1	16.7	0	....	....
ELMIRA	35,672	46	15.3	7	15.2	7	152	....

FOR MARCH —(*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
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...	3	4	3	1	2	2	12	64	48	3	47	38	57	56	19	24	48	47
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...	3	1	1	1	2	2	7	43	31	2	33	28	37	35	14	15	35	33
...	...	2	2	2	...	7	7	55	50	4	40	52	56	83	24	30	40	44
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...	...	1	...	...	...	2	2	17	16	2	12	27	26	40	13	13	21	15
1	2	2	6	...	...	8	3	73	44	7	43	39	68	68	15	24	52	49
...	1	1	...	...	...	1	...	6	12	2	6	6	4	12	...	5	3	6
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
SOUTHERN TIER DIST.—(*Con.*)									
Horseheads	4,944	10	....	4	40.0	2	....	....	....
HORNELLSVILLE	12,000	13	....	0	....	4	....	....	....
Bath	5,000	5	....	1	20.0	1	....	....	....
CORNING	11,061	9	....	3	33.3	1	222	....	....
Wellsville	5,000	9	....	1	11.1	2	222	....	....
OLEAN	9,462	5	....	1	20.0	0	200	....	1
Salamanca	4,251	5	....	1	20.0	3	....	....	....
DUNKIRK	11,616	27	....	9	33.3	10	180	....	4
JAMESTOWN	22,892	15	10.0	2	13.3	3	66	....	....
Westfield	2,430	2	....	1	50.0	0	....	....	....
Fredonia	4,125	4	....	1	25.0	1	....	....	....
Rest of district	248,594	284	13.3	32	10.7	113	50	2	2
EAST CENTRAL DISTRICT Totals	402,660	467	14.0	62	13.2	162	50	3	6
SYRACUSE	108,374	125	13.5	25	20.0	25	110	2	2
Baldwinsville	3,000	8	....	0	....	5	....	....	....
De Witt	5,435	7	....	1	14.2	1	....	....	....
CORTLAND	9,014	10	....	2	20.0	2	100	1	....
Homer	2,381	2	....	1	....	0	....	....	....
ONEIDA	7,942	7	....	0	....	3	....	....	....
Hamilton	3,744	4	....	0	....	0	250	....	1
Cazenovia	3,830	....	....	....	....	....	....	....	....
Brookfield	2,726	3	....	0	....	2	....	....	....
Norwich	5,766	7	....	0	....	2	....	....	....
Oneonta	7,147	5	....	0	....	1	200	....	1
Worcester	2,409	2	....	0	....	1	....	....	....
Cooperstown	2,368	5	....	0	....	1	....	....	....
Walton	4,869	4	....	0	....	2	....	....	....
Delhi	3,243	4	....	0	....	3	....	....	....
Liberty	4,568	11	....	0	....	4	....	....	....
Rest of district	225,844	263	13.5	33	12.6	110	25	....	2
WEST CENTRAL DISTRICT Totals	316,000	400	14.5	56	14.0	146	50	3	2
AUBURN	30,345	35	13.5	8	22.8	8	85	....	....
ITHACA	13,136	31	....	7	22.5	8	65	1	....
Hector	4,137	5	....	1	20.0	1	....	....	....
Waterloo	4,256	7	....	1	14.2	3	....	....	....
Seneca Falls	6,519	9	....	1	....	4	....	....	....
GENEVA	10,433	12	....	0	....	7	....	....	....
Canandaigua	6,151	19	....	4	21.0	6	50	....	....
Manchester	4,733	2	....	2	....	0	....	1	....
Phelps	4,788	4	....	0	....	1	....	....	....
Penn Yan	4,650	8	....	0	....	3	....	....	....
Batavia	9,180	8	....	1	12.5	2	....	....	....
Dansville	3,633	7	....	1	....	2	....	....	....
Le Roy	3,144	2	....	0	....	2	....	....	....
Warsaw	4,341	5	....	0	....	3	....	....	....
Rest of district	206,500	246	13.5	30	12.3	96	50	1	2
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	1,111	14.7	263	24.0	242	96	3	16
BUFFALO	352,387	520	17.4	166	32.0	68	121	2	8
Tonawanda	7,421	7	....	1	14.2	2	....	....	....
Amherst	4,223	6	....	2	33.3	1	....	....	....
NORTH TONAWANDA	9,069	6	....	3	50.0	0	166	....	....
LOCKPORT	16,581	17	....	4	24.2	4	166	....	....

FOR MARCH — (*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	...	3	1	...	1	1	1	...	...	...	1	2
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...	...	1	6	...	...	4	...	43	21	4	23	17	44	31	8	14	39	25
...	...	2	1	2	2	4	2	70	53	6	29	30	64	77	19	13	41	43
...	...	2	1	2	...	2	2	14	11	3	8	7	16	20	6	2	10	15
...	...	...	...	...	...	...	...	3	1	...	...	...	1	2	1	...	...	...
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...	...	...	...	...	2	2	...	42	28	2	19	17	36	47	10	8	26	22
...	...	...	...	3	5	3	3	46	40	4	31	34	51	67	20	23	35	30
...	...	...	...	1	2	...	...	3	5	1	1	2	4	5	3	2	3	3
...	...	...	...	...	...	1	...	1	3	...	2	5	4	5	3	1	1	4
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...	...	...	...	2	3	1	3	31	25	2	18	19	33	40	12	15	24	15
...	...	4	17	5	2	33	25	135	107	16	89	78	121	155	56	64	77	108
...	...	...	15	2	1	19	17	74	53	8	41	29	45	70	23	27	24	62
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...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	1	1
...	...	...	...	...	...	1	...	...	1	...	2	...	...	1	...	...	...	1
...	...	...	1	...	...	1	1	2	...	...	...	1	2	4	2	2	...	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NIAGARA FALLS	19,457	34	20.5	13	38.2	2	118	.	1
Medina	4,716	4	.....	0	.....	1	....	.	.
Albion	4,477	12	.....	0	.....	3	166	.	1
Brockport	3,400	3	.....	0	.....	1	....	.	.
ROCHESTER	162,608	176	12.0	26	15.0	40	50		
Palmyra	3,758	4	.....	0	.....	2	..	.	..
Newark	4,578	10	.....	1	10.0	4	...		..
Lyons	5,824	11	.....	3	27.3	4	90	...	1
Clyde	2,507	5	.....	0	.....	1	....	.	..
OSWEGO	22,200	16	10.0	5	31.5	2	185	.	2
Fulton	5,281	3	.....	1	.....	0	..	.	..
Richland	3,535	6	.....	1	16.7	2	....		.
Rest of district	244,181	271	12.6	37	14.2	104	75	1	3
Totals for the state	7,467,050	10,935	17.5	2,936	27.0	1,897	98	44	112
Average for past five years	....	11,579	19.5	3,138	27.0	1,680	90	64	111

REMARKS—Smallpox exists still at various points of the Adirondack region. An extensive epidemic in Plattsburg, originally from Vermont, was quelled in March; at Massena a few cases now recovered originated from a remote western State. During April, 5 cases have occurred at Mount Vernon, Tarrytown, Mamaroneck and Islip, near New York city; 12 cases have developed in Albany and 2 at Troy, brought to a cheap lodging place by a tramp from Massachusetts; and 1 at Auburn direct from Virginia. There were 51 deaths during March from smallpox: 3 at Bangor, 1 each at Binghamton, Wellsville and Albany, and 44 in New

FOR MARCH —(*Concluded*)

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	1	...	...	1	1	4	2	...	3	4	3	1	1	4	...	8
...	...	...	...	...	...	...	...	1	2	...	...	...	1	...	...	...	...	...
...	...	...	...	1	...	...	...	1	3	...	...	...	...	1	...	4	...	1
...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1	...
...	...	3	...	...	...	3	3	20	15	5	15	20	20	24	11	7	16	14
...	...	...	...	...	...	...	...	...	1	...	...	...	2	...	1	...	...	...
...	...	...	...	...	...	...	...	1	...	...	...	1	4	1	...	1	...	2
...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	...	3	3	1
...	...	...	...	...	...	...	...	1	1	...	...	1	...	...	2	...	...	...
...	...	...	...	...	...	...	1	2	...	1	...	3	2	3	1	1	...	...
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...	...	...	...	...	...	...	...	...	...	...	...	1	1	3	...	...	1	...
...	...	1	...	2	1	8	2	25	28	2	26	17	37	45	14	13	30	16
16	51	134	138	33	69	247	227	1,951	1,235	120	606	911	1,167	1,176	406	487	442	1,363
18	8	120	124	49	94	302	155	2,432	1,250	114	690	850	1,067	1,275	405	427	567	1,447

York city. There were reported about 300 cases in New York city during March and relatively at the same rate of prevalence since.

The weather was extraordinarily mild, averaging a temperature 8 degrees above the normal. Acute respiratory diseases decreased from 80 deaths daily in February to 63. Grippe probably caused 700 deaths. There were 1180 deaths from pneumonia and 808 from Bright's disease (outside New York city). The death rate from all causes was exceptionally low.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS.

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	6,387	19.1	1,702	26.6	679	135	26	36
City of New York									
Totals	3,632,501	5,998	20.0	1,604	26.7	604	138	25	36
Borough of Manhattan	1,895,491	3,359	21.5	1,178	35.0	309	124	16	18
Borough of the Bronx	244,141	449	22.5	141	31.5	36	262	1	4
Borough of Brooklyn	1,249,650	1,870	18.7	207	11.0	207	125	5	14
Borough of Queens	172,472	215	15.3	65	30.0	30	120	3	....
Borough of Richmond	70,747	105	18.0	13	13.0	22	60	....	....
Oyster Bay	16,334	1	.....	0	.....	0	....	....	....
Hempstead	27,066	15	.....	4	.....	4	....	....	....
North Hempstead	12,048	12	.....	3	25.0	2	....	....	....
Southold	8,301	11	.....	2	18.2	7	....	....	....
Sag Harbor	2,000	3	.....	0	.....	0	....	....	....
Huntington	9,483	8	.....	2	.....	1	....	....	....
Brookhaven	14,592	16	.....	3	18.7	5	65	....	....
Yonkers	47,931	62	15.3	18	29.1	8	113	....	....
Greenburg	15,564	21	.....	2	10.0	7	....	....	....
Mount Vernon	20,346	23	14.0	6	26.0	3	87	....	....
Port Chester	7,440	24	.....	10	41.5	2	175	....	....
Ossining	7,939	4	.....	3	.....	0	....	....	....
New Rochelle	14,720	14	.....	3	21.4	4	....	....	....
Peekskill	10,358	13	.....	6	48.0	2	240	....	....
White Plains	7,900	6	.....	1	16.7	1	167	....	....
Rest of district	94,383	156	19.2	35	22.8	29	50	1	....
HUDSON VALLEY DISTRICT									
Totals	690,000	948	16.8	159	16.7	231	65	4	24
Albany	94,151	136	17.5	17	12.5	26	51	....	1
Cohoes	24,000	45	23.4	13	29.0	4	222	....	6
Troy	75,057	122	20.0	26	21.5	18	75	....	4
Watervliet	14,321	17	.....	5	30.0	2	....	....	....
Green Island	4,770	3	.....	0	.....	0	....	....	....
Hoosick Falls	5,671	6	.....	0	.....	2	....	....	....
Rensselaer	10,000	11	.....	0	.....	1	90	....	1
Coxsackie	4,102	4	.....	0	.....	3	....	....	....
Catskill	5,486	11	.....	5	45.4	4	....	....	....
Hudson	9,528	13	.....	0	.....	4	150	....	....
Kingston	24,535	40	20.0	10	25.0	7	75	....	....
Ellenville	3,000	6	....	0	.....	1	....	....	....
Marbletown	3,511	1	.....	0	.....	0	....	....	....
Rosendale	6,278	4	.....	0	.....	0	250	....	1
Esopus	4,907	6	.....	0	.....	0	166	....	1
Saugerties	3,700	6	.....	2	33.3	1	....	....	....
Poughkeepsie	24,029	41	21.3	7	17.0	13	98	....	1
Fishkill	13,016	15	.....	3	20.0	2	....	....	....
Wappinger Falls	3,504	11	.....	2	18.2	2	....	....	....
Newburgh	25,000	42	20.5	10	25.8	10	166	1	....
Port Jervis	9,385	9	.....	3	33.3	3	....	....	....
Middletown	14,522	17	.....	0	.....	7	130	....	1
Warwick	6,403	6	.....	0	.....	3	....	....	....
Goshen	4,564	8	.....	0	.....	5	....	....	....

STATE DEPARTMENT OF HEALTH

cts, cities, villages and towns during April, 1902

in *italic* and towns in Roman type.]

TIC DISEASES						OTHER CAUSES OF DEATH										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
123	97	25	61	213	188	1,187	717	66	283	563	580	583	220	318	108	926
117	96	25	60	199	181	1,132	669	54	262	522	533	514	208	301	96	891
51	38	19	35	120	118	617	337	43	149	280	301	300	122	205	31	552
29	19	1	12	12	5	60	99	4	12	25	26	39	8	10	10	38
35	36	5	10	56	49	397	195	15	80	192	171	131	68	72	48	267
...	3	...	2	10	7	36	25	2	11	18	15	33	9	7	3	30
2	...	...	1	1	2	22	18	...	10	7	20	11	1	7	4	4
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1	...	...	...	1	...	2	2	...	...	2	2	2	...	...	1	2
...	...	...	...	...	...	...	2	...	1	3	2	3	...	...	1	...
...	...	...	...	...	...	1	1	...	...	2	1	3	...	...	...	3
...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...
2	...	...	...	...	...	1	2	...	1	1	...	1	...	...	...	...
...	...	...	...	...	1	3	3	...	...	1	2	2	2	...	1	1
1	...	...	...	3	3	11	6	...	7	7	7	7	3	3	1	3
...	...	...	...	...	...	...	3	...	1	2	6	4	1	...	1	3
...	...	...	...	2	...	6	3	...	1	1	2	3	1	...	...	4
2	...	...	...	2	...	4	...	...	1	2	3	7	...	2	...	1
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...	...	...	...	3	...	2	1	...	1	1	1	1	...	2	1	...
...	...	...	...	1	...	1	1	...	1	...	...	1	...	1	...	...
...	1	...	1	2	3	21	22	2	7	17	18	30	5	6	6	14
6	2	2	7	9	11	136	122	7	74	73	120	151	31	46	42	78
...	...	1	1	1	...	19	20	...	13	21	23	12	10	7	2	2
...	...	1	...	1	2	12	2	1	4	1	2	5	...	3	1	4
...	...	...	...	...	5	18	21	1	7	9	16	10	3	3	4	21
...	...	...	...	...	...	6	2	...	1	1	2	3	...	...	...	2
...	...	...	...	...	...	...	1	...	...	...	1	...	1	...	...	...
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...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	2
...	...	...	...	...	...	2	3	...	...	...	...	2	...	1	1	2
...	...	...	1	...	1	1	1	...	1	...	3	4	...	...	1	...
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...	...	...	...	...	...	1	3	...	1	1	3	1	...	2	1	2
...	...	...	...	...	...	4	2	...	1	...	2	...	...	...	...	2
5	...	...	...	1	...	1	8	...	3	6	2	5	2	1	3	4
...	...	...	...	...	...	2	1	...	1	...	...	3	...	1	...	1
...	...	...	...	...	1	4	2	...	...	2	1	5	...	...	1	...
...	...	...	...	...	...	...	2	...	...	...	2	2	...	...	...	...
...	...	...	...	...	...	1	1	...	2	1	2	1	...	...	...	...

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes
HUDSON VALLEY DIST. *(Con.)*							
Montgomery	5,939	11	.....	3	27.3	4	.....
Haverstraw	9,874	8	.....	0	.....	1	.....
Nyack	4,275	11	.....	2	18.2	2	.....
Ramapo	7,502	14	.....	7	50.0	2	285
Rest of district	268,970	324	15.0	44	14.0	104	50
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	450	14.0	77	17.1	133	70
WATERTOWN	21,700	26	14.5	10	38.5	7	.....
Ellisburg	3,888	6	.....	1	16.7	2	.....
Cape Vincent	2,882	1	.....	0	.....	0	.....
Clayton	4,313	4	.....	0	.....	1	.....
OGDENSBURG	12,633	13	12.5	1	7.5	4	75
Gouverneur	6,000	9	.....	1	11.1	3	.....
Potsdam	3,843	13	.....	4	30.0	4	.....
Canton	6,387	7	.....	0	.....	2	142
Malone	5,935	14	.....	4	28.5	3	70
Plattsburg	8,434	8	.....	4	50.0	1	250
Glens Falls	12,613	20	19.5	3	15.0	4	200
Whitehall	4,377	2	.....	1	.....	0	.....
Fort Edward	5,216	6	.....	0	.....	3	166
Sandy Hill	4,473	6	.....	1	16.7	3	166
Granville	5,217	12	.....	1	8.3	3	166
Greenwich	4,172	8	.....	1	12.5	3	375
Lowville	3,746	6	.....	1	25.0	1	250
Rest of district	278,984	289	12.5	44	15.0	89	50
MOHAWK VALLEY DISTRICT Totals	419,973	538	16.0	93	17.2	159	60
SCHENECTADY	*47,625	46	12.0	15	32.5	4	200
Cobleskill	3,973	11	.....	1	9.0	4	.....
AMSTERDAM	20,929	26	15.0	5	19.2	7	.....
Fort Plain	2,444	.....	.....	.....	.....	.....	.....
JOHNSTOWN	10,130	13	.....	2	16.0	3	80
GLOVERSVILLE	18,349	18	.....	3	16.7	4	55
LITTLE FALLS	10,381	3	.....	0	.....	0	.....
Herkimer	5,555	9	.....	6	66.6	1	444
Ilion	5,138	9	.....	0	.....	2	.....
UTICA	56,383	90	19.0	12	11.0	24	90
Whitestown	6,235	6	.....	0	.....	3	.....
ROME	15,343	27	.....	5	18.5	7	.....
Boonville	3,332	6	.....	2	33.3	2	.....
Camden	3,745	6	.....	0	.....	3	.....
Waterford	6,157	8	.....	4	50.0	1	125
Mechanicville	4,695	7	.....	0	.....	3	142
Ballston Spa	3,923	3	.....	1	.....	0	.....
Saratoga Springs	12,409	18	.....	1	5.5	8	.....
Rest of district	183,228	232	15.0	36	15.5	83	60
SOUTHERN TIER DISTRICT Totals	429,530	513	14.5	91	18.0	155	50
BINGHAMTON	39,647	64	20.0	9	14.0	12	30
Owego	5,039	1	.....	0	.....	1	.....
Candor	3,330	4	.....	0	.....	3	.....
Waverly	4,465	8	.....	2	25.0	1	125
ELMIRA	35,672	59	20.0	11	20.5	11	120

*Schenectady increased by added territory and by growth according to a police cen

FOR APRIL — (*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	...	1	3	...	...	...	...	4	...	1	1	1
...	...	...	...	...	...	...	...	...	3	...	...	3	...	1	...	...	...	1
...	...	...	...	...	...	...	...	1	2	...	...	...	4	1	1	...	1	1
...	...	...	...	...	3	...	...	2	1	...	2	...	2	2	...	...	1	...
..	...	...	2	...	2	2	1	44	26	2	24	24	38	69	13	22	18	27
...	...	6	2	2	1	6	2	40	48	4	31	21	67	69	20	16	48	55
...	...	...	...	...	...	...	...	4	...	...	4	2	3	3	1	1	3	5
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...	...	...	...	...	...	...	...	2	...	...	1	...	5	1	...	...	1	3
...	...	...	...	...	...	...	1	...	...	...	1	...	...	2	...	1	1	1
...	...	...	1	...	...	...	...	1	1	..	3	1	1	4	1	...	1	...
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...	...	1	...	...	...	1	...	1	2	...	...	4	2	...	...	...	1	...
...	...	...	...	2	...	...	...	2	...	...	1	...	...	...	...	...	2	...
...	...	...	...	...	...	...	...	...	1	...	2	...	...	1	...	...	...	1
...	...	5	1	...	1	1	...	26	36	4	16	12	44	42	15	12	31	37
...	...	4	3	1	...	10	4	57	50	2	44	47	74	77	32	24	37	62
...	...	3	...	...	...	3	...	5	4	...	2	1	3	10	1	2	1	8
...	...	...	...	...	...	...	...	1	...	...	2	1	2	...	...	...	3	2
...	...	...	...	...	...	...	...	3	2	...	5	3	2	7	1	1	1	1
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...	...	...	...	...	...	.	1	10	10	1	7	9	13	13	5	4	7	10
...	...	...	...	...	...	...	...	1	1	1	...	1	1	1	...	...	...	...
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...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	1	1
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...	...	...	...	...	...	...	1	1	1	...	1	1	1	...	...	...	1	1
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...	...	...	...	...	...	...	...	3	...	...	2	2	2	3	4	...	1	1
...	...	...	...	1	...	5	2	21	23	...	19	23	31	33	14	12	15	27
...	...	1	4	3	1	5	4	66	51	6	52	31	70	63	19	32	54	43
...	...	1	...	1	...	.	...	10	12	1	10	2	2	8	4	2	6	5
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..		...	...	...	...	3	1	5	7	...	7	6	6	4	5	3	4	5

MONTHLY BULL

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
SOUTHERN TIER DIST.—(*Con.*)								
Horseheads	4,944	3	....	0	....	0	333	...
HORNELLSVILLE	12,000	18	18.0	0	....	6	....	
Bath	5,000	4	....	0	....	0	....	.
CORNING	11,061	9	....	4	44.4	1	....	...
Wellsville	5,000	5	....	1	20.0	1	....	.
OLEAN	9,462	11	....	2	10.0	2	....	...
Salamanca	4,251	6	....	3	50.0	0	166	..
DUNKIRK	11,616	19	20.0	7	36.8	3	53	.
JAMESTOWN	22,892	34	18.0	4	11.7	9	....	..
Westfield	2,430	1	....	0	....	1	....	..
Fredonia	4,125	8	....	3	37.5	3	125	.
Rest of district	248,594	259	12.5	25	10.0	101	45	...
EAST CENTRAL DISTRICT Totals	402,660	500	16.0	69	13.8	159	42	1
SYRACUSE	108,374	132	15.0	26	20.0	24	25	1
Baldwinsville	3,000	1	....	0	....	....	....	....
De Witt	5,435	8	....	4	50.0	0	....	...
CORTLAND	9,014	8	....	0	....	5	....	...
Homer	2,381	2	....	0	....	2	....	...
ONEIDA	7,942	12	15.0	2	16.6	3	166	....
Hamilton	3,744	4	....	0	....	2	....	
Cazenovia	3,830	8	....	1	12.5	3	....	..
Brookfield	2,726	4	....	0	....	2	....	..
Norwich	5,766	6	....	1	16.6	1	....	...
Oneonta	7,147	7	....	1	14.2	2	....	.
Worcester	2,409	4	....	2	50.0	1	250	...
Cooperstown	2,368	7	....	1	14.2	4	....	.
Walton	4,869	....	....	....	....	....	....	..
Delhi	3,243	1	....	0	....	1	....	.
Liberty	4,568	13	....	0	....	5	....	.
Rest of district	225,844	283	15.3	31	11.0	102	53	..
WEST CENTRAL DISTRICT Totals	316,000	384	14.5	39	10.0	151	30	....
AUBURN	30,345	38	15.2	7	18.5	10	26	...
ITHACA	13,126	23	....	5	21.7	7	....	...
Hector	4,137	1	....	0	....	0	....	...
Waterloo	4,256	7	....	0	....	5	...	...
Seneca Falls	6,519	9	....	1	11.1	3	....	..
GENEVA	10,433	15	18.0	3	20.0	6	66	....
Canandaigua	6,151	10	....	0	....	4	....	
Manchester	4,733	4	....	0	....	1	....	
Phelps	4,788	6	....	1	16.7	1	167	..
Penn Yan	4,650	9	....	0	....	0	....	
Batavia	9,180	9	....	1	11.1	4	....	....
Dansville	3,633	4	....	0	....	2	....	....
Le Roy	3,144	6	....	1	16.6	4	....	....
Warsaw	4,341	6	....	0	....	0	....	...
Rest of district	206,500	237	14.0	20	8.5	98	35	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	1,052	14.6	214	20.0	247	80	2
BUFFALO	352,387	436	15.0	117	26.8	71	116	2
Tonawanda	7,421	10	....	2	20.0	2	....	....
Amherst	4,223	7	....	0	....	5	....	....
NORTH TONAWANDA	9,069	8	....	5	62.5	0	500	....
LOCKPORT	16,581	21	15.5	6	30.0	3	60	....

R APRIL —(*Continued*)

YMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...
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...	...	...	...	...	...	...	4	4	...	4	4	4	6	1	1	2	4
...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
...	...	1	...	...	...	...	1	...	1	1	...	...	2	...	1	...	1
...	...	2	2	...	2	3	29	23	4	19	15	44	36	5	18	35	19
...	1	...	1	4	6	5	50	46	8	47	41	78	68	33	19	37	52
...	...	...	...	...	...	2	8	10	3	12	8	18	25	13	5	6	21
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...	1	...	1	3	4	3	28	28	5	29	32	45	32	13	13	20	23
...	...	...	2	4	1	...	39	42	5	32	31	72	50	22	14	27	59
...	...	...	...	1	...	...	4	7	...	4	3	6	3	3	3	...	4
...	...	...	...	...	...	...	2	4	1	3	1	2	3	1	...	1	5
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...	...	...	...	...	...	...	1	2	1	...	1	2	1	1	...	...	1
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...	...	...	1	3	1	...	25	21	3	16	19	50	32	12	7	20	24
1	1	14	8	7	18	17	141	78	10	81	65	127	180	62	46	61	116
1	...	11	6	2	11	11	67	35	5	23	23	45	67	17	18	27	57
...	...	...	...	...	...	...	3	...	...	1	1	2	...	1	...	...	2
...	...	...	...	...	...	...	2	...	...	...	...	1	1	...	1	1	1
...	...	1	...	1	1	...	1	...	...	...	...	1	...	1	1	...	1
...	...	...	...	...	...	1	2	...	...	2	1	2	5	1	1	...	6

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NIAGARA FALLS	19,457	29	18.0	11	37.5	2	207	....	4
Medina	4,716	12	....	3	25.0	3	84	....	....
Albion	4,477	7	....	2	25.0	1	125	....	1
Brockport	3,400	5	....	2	40.0	2	....	....	....
ROCHESTER	162,608	189	14.2	20	10 5	37	16	....	....
Palmyra	3,758	3	....	0	....	3	....	....	....
Newark	4,578	9	....	0	....	4	....	....	....
Lyons	5,824	6	....	1	16 6	3	....	....	....
Clyde	2,507	4	....	0	....	1	....	....	....
OSWEGO	22,200	31	17.0	4	13.0	5	....	....	....
FULTON	8,734	7	....	0	....	3	....	....	....
Richland	3,535	2	....	0	....	2	....	....	....
Rest of district	244,184	266	13.5	41	15.5	100	56	....	3
Totals for the state	7,467,050	10,772	17.5	2,444	22.5	1,914	100	42	103
Average for past 5 years	....	10,846	18.8	2,894	26.6	1,485	91	68	95

REMARKS —The total mortality is the same as for March, 17.5 per 1000 population. The zymotic rate is unchanged. Smallpox caused 57 deaths in New York city, 3 in Albany and 1 in Buffalo There has been a considerable outbreak in Albany and vicinity· in the Adirondack region smallpox is abating, our inspectors are cleaning all camps that were infected during

FOR APRIL — (*Concluded*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	2	...	...	1	1	6	2	...	3	...	1	3	2	2	...	2
...	...	...	...	...	...	1	...	1	2	...	1	1	3	2	...	...	...	1
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...	...	1	...	...	...	...	2	21	15	2	19	15	24	45	13	8	8	16
...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...
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...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	1	...	...	...
...	...	...	...	...	...	...	...	7	1	...	1	3	8	5	1	4	...	1
...	...	...	...	...	...	...	...	...	1	...	3	...	1	...	...	1	1	...
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...	...	...	...	2	4	4	2	30	15	3	25	14	37	44	24	10	21	28
12	61	142	122	44	85	268	231	1,716	1,154	108	644	872	1,188	1,241	439	515	414	1,371
23	10	111	119	54	94	272	146	2,105	1,209	101	709	814	1,000	1,226	367	454	511	1,358

the winter, and it is safe to say that no one, at least recently vaccinated, need hesitate to visit that region now or during the summer. Acute respiratory diseases decreased to 55 daily deaths; grippe caused about 400 deaths; pneumonia, 1000, and Bright's disease (outside New York city), 242.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT Totals	3,948,906	6,184	18.6	1,984	32.1	605	132	25	40
CITY OF NEW YORK Totals	3,632,501	5,771	18.7	1,893	32.8	524	120	23	36
BOROUGH OF MANHATTAN	1,895,491	3,137	19.5	1,061	33.8	250	123	13	17
BOROUGH OF THE BRONX	244,141	434	20.8	138	32.0	33	210	3	1
BOROUGH OF BROOKLYN	1,249,650	1,901	18.3	614	32.3	192	144	7	17
BOROUGH OF QUEENS	172,472	220	15.0	80	36.4	24	105	....	1
BOROUGH OF RICHMOND	70,747	79	13.0	7	9.0	25	75	....	....
Oyster Bay	16,334	25	....	5	20.0	11	160	1	....
Hempstead	27,066	21	....	5	....	6	....	....	....
North Hempstead	12,048	14	....	3	21.5	2	215	....	1
Southold	8,301	5	....	0	....	2	....	....	....
Sag Harbor	2,000	3	....	0	....	1	....	....	....
Huntington	9,483	7	....	1	....	1	....	....	1
Brookhaven	14,592	13	....	3	....	4	....	....	....
YONKERS	47,931	60	14.5	13	21.6	13	117	....	1
Greenburg	15,564	11	....	6	....	4	....	....	....
MOUNT VERNON	20,346	23	13.5	9	28.5	1	260	1	1
Port Chester	7,440	20	....	9	45.0	2	50	....	....
Ossining	7,939	6	....	1	16.7	2	....	....	....
NEW ROCHELLE	14,720	19	....	4	21.0	2	....	....	....
Peekskill	10,358	21	....	6	30.0	5	....	....	....
White Plains	7,900	8	....	2	....	2	....	....	....
Rest of district	94,383	157	19.5	34	21.5	23	57	....	....
HUDSON VALLEY DISTRICT Totals	690,000	1,041	17.5	171	16.5	237	72	7	17
ALBANY	94,151	166	20.7	25	15.0	23	66	....	2
COHOES	24,000	33	16.1	9	27.3	2	60	....	1
TROY	75,057	134	20.8	22	16.5	20	37	1	1
WATERVLIET	14,321	14	....	3	21.4	0	214	1	1
Green Island	4,770	6	....	0	....	0	....	....	....
Hoosick Falls	5,671	13	....	2	16.2	3	....	....	....
RENSSELAER	10,000	14	....	3	21.4	3	70	....	....
Coxsackie	4,102	7	....	3	43.0	1	145	....	....
Catskill	5,486	17	....	2	11.8	7	118	....	1
HUDSON	9,528	22	....	4	18.2	4	....	....	....
KINGSTON	24,535	36	17.3	7	20.0	10	111	....	2
Ellenville	3,000	3	....	1	....	1	....	....	....
Marbletown	3,511	3	....	1	....	1	....	....	....
Rosendale	6,278	3	....	1	....	0	....	....	1
Esopus	4,907	13	....	2	16.6	3	82	....	1
Saugerties	3,700	12	....	1	8.3	5	....	....	....
POUGHKEEPSIE	24,029	40	19.2	8	20.0	10	75	1	....
Fishkill	13,016	23	....	6	26.0	6	77	....	....
Wappinger Falls	3,504	2	....	1	....	1	....	....	....
NEWBURGH	25,000	38	18.0	12	32.0	5	250	2	....
Port Jervis	9,385	22	....	5	22.5	5	136	....	2
MIDDLETOWN	14,522	13	....	2	....	3	....	....	....
Warwick	6,403	9	....	4	44.4	2	....	....	....
Goshen	4,564	5	....	1	20.0	2	....	....	....

ORK STATE DEPARTMENT OF HEALTH

istricts, cities, villages and towns during May, 1902

llages in *italic* and towns in Roman type]

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
3	40	144	73	21	66	191	204	1,140	706	53	246	524	601	490	263	393	89	862
1	35	139	69	18	63	187	199	1,079	658	52	220	491	550	437	250	361	73	820
3	...	70	19	15	30	97	124	604	314	29	116	251	316	216	155	222	28	498
2	20	29	13	1	7	6	9	58	92	9	10	28	26	36	13	25	4	42
6	15	35	36	1	24	72	60	361	229	13	72	178	176	149	73	95	30	252
.	...	2	1	...	1	12	6	40	14	1	16	28	23	31	6	11	3	24
.	...	3	...	1	1	...	...	16	9	...	6	6	9	5	3	8	8	4
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1	3	...	...	2	3	...	...	21	29	...	5	15	24	22	3	9	6	14
3	5	11	1	1	8	11	10	135	141	8	76	77	140	148	49	55	42	96
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIST.—(*Con.*)									
Montgomery	5,939	6	....	3	....	0	....	....	....
Haverstraw	9,874	11	....	3	27.3	0	90	....	....
Nyack	4,275	12	....	0	....	1	80	....	....
Ramapo	7,502	17	....	5	33.3	5	135	....	....
Rest of district	268,970	347	14.5	35	10.0	114	50	2	5
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	381	12.0	55	14.5	127	70	2	11
Watertown	21,700	27	15.0	4	15.0	7	150	1	3
Ellisburg	3,888	2	....	1	50.0	1	....	....	....
Cape Vincent	2,882	....	....	....	....	....	....	....	....
Clayton	4,313	4	....	1	25.0	1	....	....	....
Ogdensburg	12,633	16	....	2	12.5	6	125	....	2
Gouverneur	6,000	5	....	0	....	1	....	....	....
Potsdam	3,843	1	....	1	....	0	....	....	....
Canton	6,387	4	....	1	25.0	1	250	....	....
Malone	5,935	11	....	5	45.5	1	273	....	....
Plattsburg	8,434	8	....	1	12.5	3	....	....	....
Glens Falls	12,613	13	....	1	7.7	6	77	....	
Whitehall	4,377	5	....	0	....	2	....	....	....
Fort Edward	5,216	6	....	0	....	2	166	....	1
Sandy Hill	4,473	5	....	0	....	2	....	....	....
Granville	5,217	4	....	1	25.0	1	....	....	....
Greenwich	4,172	1	....	0	....	0	....	....	....
Lowville	3,746	5	....	0	....	1	200	....	....
Rest of district	278,984	264	12.0	37	14.0	92	56	1	4
MOHAWK VALLEY DISTRICT Totals	419,973	562	16.5	111	20.0	153	70	1	6
Schenectady	47,625	59	15.0	9	15.0	6	135	....	....
Cobleskill	3,973	2	....	0	....	0	....	....	....
Amsterdam	20,929	28	15.7	10	35.7	4	36	....	1
Fort Plain	2,444	....	....	....	....	....	....	....	....
Johnstown	10,130	11	....	0	....	2	90	....	1
Gloversville	18,349	26	18.0	8	30.0	7	75	1	....
Little Falls	10,381	6	....	2	....	3	....	....	....
Herkimer	5,555	3	....	1	....	0	....	....	....
Ilion	5,138	5	....	0	....	2	....	....	....
Utica	56,383	90	18.7	20	22.2	19	100	....	2
Whitestown	6,235	9	....	3	33.3	0	....	....	....
Rome	15,343	22	16.5	3	13.5	5	90	....	1
Boonville	3,332	11	....	3	27.3	2	90	....	....
Camden	3,745	2	....	0	....	1	....	....	....
Waterford	6,157	8	....	2	25.0	2	....	....	....
Mechanicville	4,695	12	....	2	16.6	2	....	....	....
Ballston Spa	3,923	9	....	0	....	4	....	....	....
Saratoga Springs	12,409	21	....	1	5.0	5	....	....	....
Rest of district	183,228	238	15.0	47	20.0	89	60	....	1
SOUTHERN TIER DISTRICT Totals	429,530	513	14.0	78	15.0	175	90	3	8
Binghamton	39,647	66	19.8	11	16.6	18	90	1	2
Owego	5,039	12	....	1	....	5	....	....	....
Candor	3,330	4	....	1	25.0	3	....	....	....
Waverly	4,465	5	....	0	....	1	400	....	1
Elmira	35,672	45	15.0	5	11.1	11	135	1	1

MAY —(*Continued*)

ZYMOTIC DISEASES						OTHER CAUSES OF DEATH										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
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1	...	...	1	2	3	35	42	3	24	22	56	71	19	15	23	21
...	7	1	1	...	2	40	37	3	33	27	41	52	21	21	32	47
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...	4	1	1	...	1	33	30	3	25	15	25	43	17	12	19	28
5	...	4	...	14	11	78	48	3	57	42	54	75	29	30	34	71
...	...	...	...	4	4	7	10	...	6	6	3	5	2	4	3	5
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...	...	...	...	...	...	5	3	...	2	2	3	3	...	1	1	7
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...	...	1	...	...	...	7	1	...	1	...	3	3	2	2	1	2
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...	...	2	...	1	4	9	9	...	7	7	14	7	6	6	1	15
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...	...	...	...	1	...	2	3	...	2	...	3	2	1	2	2	3
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5	...	1	...	8	2	37	12	2	28	18	20	39	13	9	7	26
5	7	2	2	8	7	47	41	3	35	47	76	69	28	27	44	51
...	...	...	1	...	...	6	7	...	6	9	4	8	2	5	7	6
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...	...	...	...	2	1	4	4	...	1	11	7	4	4	1	2	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis
SOUTHERN TIER DIST. (*Con.*)								
Horseheads	4,944	14	....	3	25.0	6	....	....
HORNELLSVILLE	12,000	12	....	1	8.5	1	85	....
Bath	5,000	4	....	1	25.0	2	250	1
CORNING	11,061	14	....	3	21.4	[illegible]	142	
Wellsville	5,000	7	....	0	....	4	....	....
OLEAN	9,462	13	....	5	38.5	[illegible]	385	....
Salamanca	4,251	8	....	4	50.0	2	125	....
DUNKIRK	11,616	18	....	5	27.7	[illegible]	....	....
JAMESTOWN	22,892	18	10.0	1	5.5	[illegible]	111	....
Westfield	2,430	8	....	0	....	3	....	....
Fredonia	4,125	7	....	1	14.2	1	285	....
Rest of district	248,594	258	12.1	36	14.0	102	65	....
EAST CENTRAL DISTRICT Totals	402,660	467	14.5	73	15.7	15[illegible]	32	3
SYRACUSE	108,374	135	15.0	32	24.0	29	52	1
Baldwinsville	3,000	2	....	1	50.0	0	....	....
De Witt	5,435	5	....	0	....	2	....	....
CORTLAND	9,014	5	....	0	....	2	....	....
Homer	2,381	2	....	0	....	1	500	....
ONEIDA	7,942	8	....	2	25.0	0	250	1
Hamilton	3,744	....	....	....	....	....	....	....
Cazenovia	3,830	1	....	0	....	0	....	....
Brookfield	2,726	1	....	0	....	0	....	....
Norwich	5,766	6	....	0	....	[illegible]	....	....
Oneonta	7,147	14	....	2	14.2	4	....	....
Worcester	2,409	2	....	1	50.0	0	....	....
Cooperstown	2,368	1	....	0	....	1	....	....
Walton	4,869	7	....	0	....	2	....	....
Delhi	3,243	2	....	0	....	2	....	....
Liberty	4,568	5	....	0	....	1	200	....
Rest of district	225,844	271	14.0	35	13.0	104	15	1
WEST CENTRAL DISTRICT Totals	316,000	390	14.5	58	15.0	133	35	....
AUBURN	30,345	37	14.5	4	10.8	12	83	....
ITHACA	13,136	21	....	5	24.0	3	....	....
Hector	4,137	3	....	2	66.6	1	....	....
Waterloo	4,256	5	....	2	40.0	0	....	....
Seneca Falls	6,519	17	....	4	23.5	1	....	....
GENEVA	10,433	17	....	2	11.8	7	....	....
Canandaigua	6,151	7	....	1	14.2	2	....	....
Manchester	4,733	6	....	1	16.6	2	....	....
Phelps	4,788	3	....	0	....	1	....	....
Penn Yan	4,650	7	....	0	....	2	142	....
Batavia	9,180	10	....	3	30.0	2	100	....
Dansville	3,633	4	....	0	....	2	....	....
Le Roy	3,144	3	....	1	33.3	2	....	....
Warsaw	4,341	10	....	3	30.0	3	....	....
Rest of district	206,500	240	13.6	30	12.5	92	35	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	1,078	14.5	248	23.0	257	75	5
BUFFALO	352,387	422	14.0	125	29.6	65	115	5
Tonawanda	7,421	9	....	2	22.2	3	....	....
Amherst	4,223	2	....	2	....	0	....	....

FOR MAY — (*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
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1	2	...	...	1	1	2	2	40	33	4	26	36	71	48	21	20	31	48
...	2	...	...	...	...	...	...	2	3	...	3	3	7	6	2	2	2	4
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1	...	...	...	...	1	1	2	26	22	3	12	24	47	33	8	11	22	25
...	2	9	15	2	4	16	18	141	83	8	77	92	127	139	61	68	81	119
...	...	2	10	1	1	12	12	74	32	2	19	35	40	62	24	20	23	43
...	...	...	...	...	...	...	...	[illegible]	1	...	1	...	...	1	...	1	...	1
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DIST. (*Con.*)									
NORTH TONAWANDA	9,069	11	....	7	63.5	0	180	..	..
LOCKPORT	16,581	18	....	5	27.7	2	165	..	1
NIAGARA FALLS	19,457	23	14.0	7	30.0	3	85	..	1
Medina	4,716	2	....	0	....	0	....	..	..
Albion	4,477	8	....	0	....	2	125	..	1
Brockport	3,400	8	....	1	12.5	3	....	..	..
ROCHESTER	162,608	208	15.0	34	16.5	58	60	1	1
Palmyra	3,758	6	....	1	16.7	2	....	..	..
Newark	4,578	8	....	1	12.5	4	....	..	..
Lyons	5,824	6	....	1	16.6	3	166	..	..
Clyde	2,507	9	....	2	22.2	0	....	..	..
OSWEGO	22,200	30	16.0	4	13.3	8	33	..	1
FULTON	*8,734	11	....	3	27.3	1	....	..	..
Richland	3,535	6	....	1	16.6	3	....	..	..
Rest of district	244,184	291	14.0	52	17.5	100	40	..	1
Totals for the state	7,467,050	10,616	17.0	2,778	26.2	1,837	105	46	99
Average for past five years	....	9,970	17.0	2,661	26.6	1,750	96	59	88

*Fulton incorporated with Oswego Falls as a city.

REMARKS—There were 52 deaths from smallpox during May: 35 in New York city; 1 each in Yonkers, Mount Vernon and Mamaroneck and 2 in Smithtown; 4 in Albany; 1 in Troy; 1 each in Canton and Santa Clara; 1 in Elmira; 2 in Auburn and 2 in Rochester. During June smallpox has been brought to several places in Westchester county by telephone linemen; it continues in Albany, 35 cases; at Auburn and Elmira imported from New Jersey; at Rochester, where a considerable number have been distributed by a tramp, and has spread to towns of Fayette and Richmond; at Corning several cases following 1 diagnosed as varicella; at Buffalo, 6 cases originating from Pennsylvania; at Syracuse, 1 from New York; in towns of Catharine

R MAY —(*Concluded*)

YMOTIC DISEASES							OTHER CAUSES OF DEATH											
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
......	...	1	...	...	1	...	3	...	...	1	...	...	2	...	3	...	...
......	...	1	...	...	1	...	2	...	1	1	2	3	2	...	1	...	3
......	...	...	...	1	...	...	4	2	...	2	3	...	2	...	2	1	5
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2	4	...	...	...	2	3	15	17	2	20	20	34	25	16	15	18	13
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......	...	...	...	...	...	...	1	...	1	...	2	2	...	...	2	...	1
......	...	...	...	...	...	...	3	2	1	5	2	2	1	3	2	3	5
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......	...	...	...	...	...	...	...	...	...	...	1	1	1	...	1	1	1
...	3	3	...	2	...	3	31	22	1	20	19	37	40	15	20	21	43
52	175	104	32	83	243	259	1,673	1,135	86	546	885	1,179	[illegible]	501	633	[illegible]	1,220
16	117	115	41	78	268	151	1,526	1,172	69	607	760	972	1,137	389	537	462	1,270

d Hector (Schuyler county) brought by a minstrel troupe. In the Adirondack region scattered localities continue it—in Lewis county, in Clinton county and the town of Dickinson, d to some extent still in one or two lumber camps directly imported from Canada, although al boards of health have been directed to require the employment of no unvaccinated lumbermen.

The death rate is that of the average, and lower than in April. The zymotic mortality is her high, chiefly from diarrheal diseases. Grippe added a few deaths, probably 100. Pneumonia caused 682 deaths and Bright's disease (including New York city), 418.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	5,798	17.9	2,101	34.5	497	200	20	48
CITY OF NEW YORK									
Totals	3,632,501	5,404	18.1	2,004	37.0	431	200	18	46
BOROUGH OF MANHATTAN	1,895,491	2,767	17.8	979	35.2	202	167	16	17
BOROUGH OF THE BRONX	244,141	390	19.5	135	34.6	24	312	....	3
BOROUGH OF BROOKLYN	1,249,650	1,933	19.3	785	40.0	161	250	1	23
BOROUGH OF QUEENS	172,472	227	16.0	85	37.5	31	188	1	1
BOROUGH OF RICHMOND	70,747	87	15.0	20	22.0	13	115	....	2
Oyster Bay	16,334	3	....	1	33.3	2	323	....	....
Hempstead	27,066	36	16.2	4	11.1	12	110	....	1
North Hempstead	12,048	26	....	8	31.0	3	190	....	....
Southold	8,301	6	....	1	16.7	2	....	....	....
Sag Harbor	2,000	5	....	0	....	4	....	....	....
Huntington	9,483	6	....	1	16.7	2	....	....	....
Brookhaven	14,592	20	....	3	....	6	....	....	....
YONKERS	47,931	67	16.5	32	44.8	7	210	1	....
Greenburg	15,564	22	....	4	18.2	3	....	....	....
MOUNT VERNON	20,346	23	14.0	9	39.0	1	217	....	1
Port Chester	7,440	7	....	3	42.8	0	285	1	....
Ossining	7,939	....	....	....	....	....	....	....	....
NEW ROCHELLE	14,720	19	....	9	50.5	1	220	....	....
Peekskill	10,358	18	....	2	....	2	....	....	....
White Plains	7,900	9	....	....	....	....	....	....	....
Rest of district	94,383	127	16.3	20	15.6	21	125	....	....
HUDSON VALLEY DISTRICT									
Totals	690,000	776	14.0	160	20.5	169	73	3	12
ALBANY	94,151	102	13.0	18	18.0	18	70	....	3
COHOES	24,000	28	14.5	14	50.0	1	140	....	....
TROY	75,057	105	17.0	29	28.0	14	85	....	3
WATERVLIET	14,321	14	....	4	28.5	1	142	....	....
Green Island	4,770	8	....	2	25.0	0	....	....	....
Hoosick Falls	5,671	10	....	2	20.0	1	....	....	....
RENSSELAER	10,000	11	....	2	18.2	1	....	....	....
Coxsackie	4,102	4	....	2	50.0	2	....	....	....
Catskill	5,486	8	....	2	25.0	2	125	....	....
HUDSON	9,528	12	....	2	16.7	3	....	....	....
KINGSTON	24,535	22	....	5	22.5	2	90	....	1
Ellenville	3,000	5	....	1	....	2	....	....	....
Marbletown	3,511	6	....	1	16.6	2	....	....	....
Rosendale	6,278	9	....	2	....	1	....	....	1
Esopus	4,907	....	....	....	....	....	....	....	....
Saugerties	3,700	3	....	0	....	2	....	....	....
POUGHKEEPSIE	24,029	37	....	8	....	10	....	....	....
Fishkill	13,016	14	....	2	14.2	1	70	....	....
Wappinger Falls	3,504	7	....	1	14.2	2	....	....	....
NEWBURGH	25,000	35	17.0	9	25.7	3	130	1	....
Port Jervis	9,385	14	....	3	21.4	0	142	1	....
MIDDLETOWN	14,522	20	....	4	20.0	2	100	....	....
Warwick	6,403	1	....	1	....	0	....	....	....
Goshen	4,564	15	....	4	24.5	6	120	....	....

ORK STATE DEPARTMENT OF HEALTH

stricts, cities, villages and towns during June, 1902

lages in *italic* and towns in Roman type.]

YMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
57	98	81	18	69	184	587	644	650	44	276	490	522	422	221	393	70	893
54	94	78	16	58	178	567	613	615	43	243	463	482	374	199	359	48	846
1	49	24	12	30	96	216	339	315	21	119	252	262	204	122	196	13	458
38	21	16	1	9	3	27	23	87	3	16	21	15	19	5	29	3	47
15	22	37	3	17	73	286	215	186	18	95	162	168	124	65	101	24	297
...	1	1	...	1	4	34	30	19	...	7	17	24	18	5	26	6	32
...	1	...	...	1	2	4	6	8	1	6	11	13	9	2	7	2	12
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...	...	...	...	3	...	2	3	4	...	3	...	2	1	2	3	1	2
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...	...	1	...	...	...	...	1	2	1	2	1	3	2	...	1	2	4
...	3	...	...	...	1	9	7	5	...	4	7	3	10	3	4	2	8
...	...	...	...	...	...	...	2	...	...	2	3	3	5	...	2	2	3
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3	1	1	2	5	1	3	8	13	...	10	7	16	18	7	14	3	15
3	4	3	2	6	11	11	59	85	2	57	52	118	104	40	51	53	98
2	..	2	...	...	...	...	9	14	...	5	6	25	12	6	6	4	8
...	...	...	...	3	...	1	...	4	...	2	...	2	7	1	1	...	7
...	1	...	...	2	1	2	10	13	...	7	5	10	15	3	7	5	21
1	...	...	...	...	...	1	2	1	...	1	3	...	1	1	...	1	2
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...	1	...	...	...	5	1	2	5	1	2	2	4	3	...	2	1	5
...	...	...	...	...	...	1	2	1	...	...	1	2	2	1	...	1	2
...	...	...	...	...	...	...	2	2	...	1	1	2	2	1	4	1	2
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...	...	...	...	...	...	2	1	2	...	1	...	2	1	...	...	4	2

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIST. (*Con.*)									
Montgomery	5,939	6	....	0	....	3	166	....	....
Haverstraw	9,874	14	....	5	35.5	2	142	....	1
Nyack	4,275	....	....	....	....	....	....	....	....
Ramapo	7,502	4	....	1	25.0	2	....	....	....
Rest of district	268,970	262	12.5	36	14.0	86	43	1	3
ADIRONDACK AND NORTHERN DISTRICT									
Totals	394,772	376	11.6	84	22.5	102	75	2	6
WATERTOWN	21,700	20	12.0	5	25.0	3	100	....	1
Ellisburg	3,888	2	....	0	....	1	....	....	....
Cape Vincent	2,882	4	....	0	....	0	....	....	....
Clayton	4,313	5	....	0	....	2	200	....	....
OGDENSBURG	12,633	24	....	5	20.5	10	166	1	3
Gouverneur	6,000	8	....	1	12.5	2	250	....	1
Potsdam	3,843	3	....	1	33.3	1	....	....	....
Canton	6,387	0	....	....	....	....	....	....	....
Malone	5,935	4	....	....	....	....	....	....	....
Plattsburg	8,434	11	....	3	25.5	3	90	....	....
Glens Falls	12,613	14	....	3	....	2	....	....	1
Whitehall	4,377	8	....	4	....	1	....	....	....
Fort Edward	5,216	9	....	2	....	1	....	....	....
Sandy Hill	4,473	7	....	2	....	3	....	....	....
Granville	5,217	7	....	5	71.4	0	142	....	....
Greenwich	4,172	5	....	0	....	1	....	....	....
Lowville	3,746	4	....	0	....	0	....	....	....
Rest of district	278,984	241	10.5	53	22.3	72	60	1	....
MOHAWK VALLEY DISTRICT									
Totals	419,973	489	14.7	97	20.0	132	70	1	6
SCHENECTADY	47,625	66	17.0	16	24.5	7	212	....	....
Cobleskill	3,973	2	....	0	....	1	....	....	....
AMSTERDAM	20,929	14	....	4	....	3	....	....	....
Fort Plain	2,444	4	....	0	....	1	....	....	....
JOHNSTOWN	10,130	10	....	0	....	3	....	....	....
GLOVERSVILLE	18,349	15	....	2	13.0	4	200	....	1
LITTLE FALLS	10,381	16	....	1	6.2	3	125	....	1
Herkimer	5,555	5	....	1	20.0	3	....	....	....
Ilion	5,138	3	....	1	....	0	....	....	....
UTICA	56,383	88	19.0	19	21.6	20	35	1	1
Whitestown	6,235	7	....	2	28.5	1	....	....	....
ROME	15,343	13	....	2	15.0	3	....	....	....
Boonville	3,332	8	....	0	....	2	....	....	....
Camden	3,745	1	....	1	....	0	....	....	....
Waterford	6,157	4	....	0	....	0	....	....	....
Mechanicville	4,695	5	....	3	60.0		200	....	....
Ballston Spa	3,923	7	....	3	42.5	2	....	....	....
Saratoga Springs	12,409	24	....	3	12.5	4	40	....	....
Rest of district	183,228	197	12.5	39	20.0	75	40	....	3
SOUTHERN TIER DISTRICT									
Totals	420,530	399	11.5	59	15.0	114	50	2	6
BINGHAMTON	39,647	56	17.0	8	14.2	12	90	....	1
Owego	5,039	3	....	1	33.3	0	....	....	....
Candor	3,330	2	....	0	....	1	....	....	....
Waverly	4,465	6	....	0	....	3	....	....	....
ELMIRA	35,672	30	10.2	4	13.3	4	....	....	....

FOR JUNE — (*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	1	...	1	...	...	...	1	1	...	...	1	1	...
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1	...	1	1	...	1	3	1	12	25	...	21	23	49	36	17	19	24	24
...	1	1	3	1	4	6	4	29	29	7	31	26	59	41	21	20	29	56
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...	1	1	3	...	3	3	2	20	22	3	20	17	34	28	11	10	22	40
...	...	4	2	1	...	5	13	41	42	4	42	34	61	56	26	41	42	68
...	...	3	2	1	...	3	5	7	8	...	7	6	7	5	...	4	3	5
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...	...	...	...	...	...	...	5	15	14	2	16	13	28	26	11	9	25	30
...	...	1	...	3	1	5	2	30	31	1	35	37	67	69	17	27	24	41
...	...	...	...	...	...	4	...	6	7	1	2	6	6	11	1	4	2	5
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes
SOUTHERN TIER DIST.—(*Con.*)							
Horseheads	4,494	2	....	0	....	0	....
HORNELLSVILLE	12,000	9	....	0	....	2	....
Bath	5,000	2	....	0	....	0	....
CORNING	11,061	11	....	0	....	5	....
Wellsville	5,000	7	....	0	....	1	....
OLEAN	9,462	6	....	0	....	0	....
Salamanca	4,251	8	....	2	25.0	3	....
DUNKIRK	11,616	17	....	8	47.0	3	175
JAMESTOWN	22,892	17	10.0	4	23.0	5	58
Westfield	2,430	1	....	1	....	0	....
Fredonia	4,125	7	....	3	....	0	....
Rest of district	248,594	215	12.0	28	12.5	75	46
EAST CENTRAL DISTRICT Totals	402,660	406	14.0	59	15.0	127	40
SYRACUSE	108,374	107	12.0	18	17.6	18	38
Baldwinsville	3,000	1	....	0	....	1	....
De Witt	5,435	1	....	0	....	0	....
CORTLAND	9,014	9	....	1	....	3	....
Homer	2,381	2	....	0	....	2	....
ONEIDA	7,942	5	....	0	....	0	....
Hamilton	3,744	5	....	0	....	3	....
Casenovia	3,830	....	....	....	....	....	....
Brookfield	2,726	4	....	2	....	0	....
Norwich	5,766	5	....	0	....	0	....
Oneonta	7,147	6	....	0	....	2	....
Worcester	2,409	3	....	0	....	1	....
Cooperstown	2,368	5	....	2	....	1	....
Walton	4,869	4	....	1	25.0	2	....
Delhi	3,243	1	....	0	....	1	....
Liberty	4,568	10	....	1	10.0	1	200
Rest of district	225,844	238	12.0	34	14.5	92	35
WEST CENTRAL DISTRICT Totals	316,000	307	12.0	31	10.0	110	30
AUBURN	30,345	27	11.0	3	11.1	5	145
ITHACA	13,136	7	....	0	....	2	....
Hector	4,137	4	....	0	....	0	....
Waterloo	4,256	7	....	1	14.2	4	....
Seneca Falls	6,519	2	....	0	....	0	....
GENEVA	10,433	10	....	5	50.0	2	100
Canandaigua	6,151	7	....	2	28.5	2	....
Manchester	4,733	6	....	1	16.7	1	167
Phelps	4,788	7	....	0	....	1	....
Penn Yan	4,650	10	....	2	20.0	4	....
Batavia	9,180	5	....	0	....	2	....
Dansville	3,633	5	....	1	20.0	0	....
Le Roy	3,144	4	....	0	....	1	....
Warsaw	4,341	2	....	0	....	0	....
Rest of district	206,500	204	12.0	16	8.0	86	20
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	898	12.5	199	22.2	187	85
BUFFALO	352,387	364	12.5	104	28.5	51	120
Tonawanda	7,421	5	....	0	....	2	....
Amherst	4,223	4	....	0	....	2	....

UNE—(*Continued*)

YMOTIC DISEASES						OTHER CAUSES OF DEATH										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
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1	...	2	1	...	1	14	11	...	20	20	45	36	10	15	17	17
...	1	1	3	2	2	31	32	4	31	32	59	71	25	31	30	45
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...	...	1	2	1	1	15	18	3	22	18	37	43	13	17	21	23
...	...	1	1	...	...	19	24	3	26	20	48	56	19	20	34	28
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...	...	...	...	...	...	13	18	1	18	10	32	40	9	17	27	15
3	10	1	2	15	17	91	87	9	72	67	107	130	42	63	56	99
2	8	1	...	12	10	50	39	3	14	21	42	42	16	34	17	42
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MONTHLY BULLETIN

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Continued.*)									
NORTH TONAWANDA	9,069	12	....	8	66.6	2	83	1	....
LOCKPORT	16,581	16	....	5	31.5	2	62	....	....
NIAGARA FALLS	19,457	35	21.5	15	42.5	3	228	1	2
Medina	4,716	8	....	0	....	3	....	....	....
Albion	4,477	4	....	0	....	2	....	....	....
Brockport	3,400	2	....	0	....	1	....	....	....
ROCHESTER	162,608	171	12.8	33	18.8	21	43	....	2
Palmyra	3,758	4	....	1	25.0	2	....	....	....
Newark	4,578	5	....	0	....	2	....	....	....
Lyons	5,824	4	....	1	25.0	1	....	....	....
Clyde	2,507	4	....	0	....	0	....	....	....
OSWEGO	22,200	30	16.5	3	10.0	6	....	....	....
FULTON	8,734	8	....	1	12.5	4	....	....	....
Richland	3,535	4	....	0	....	2	....	....	....
Rest of district	244,184	218	11.0	28	12.7	81	32	....	2
Totals for the state	7,467,056	9,449	15.5	2,790	29.5	1,438	150	36	90
Average for past five years	....	9,210	16.1	2,226	24.2	1,476	135	61	73

UNE —(*Concluded*)

YMOTIC DISEASES						OTHER CAUSES OF DEATH											
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of Digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	1	...	4	1	...	1	...	...	...	4
...	...	...	...	1	...	1	1	...	3	...	1	1	1	2	1	4
1	1	...	...	...	2	6	1	...	3	4	4	2	1	1	1	4
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...	...	...	1	...	4	10	18	3	18	16	21	26	8	10	9	18
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111	100	28	86	228	636	944	980	74	570	758	1,041	949	411	646	338	1,328
89	100	29	75	251	498	942	1,043	88	781	693	831	1,039	382	626	374	1,191

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	**3,948,906**	**6,987**	**21.0**	**3,265**	**47.0**	**593**	**320**	**34**	**64**
CITY OF NEW YORK									
Totals	**3,632,501**	**6,487**	**21.0**	**3,090**	**48.0**	**498**	**325**	**34**	**61**
BOROUGH OF MANHATTAN	1,895,491	3,270	20.3	1,526	50.0	221	285	21	26
BOROUGH OF THE BRONX	244,141	503	22.0	208	41.6	25	400	4	6
BOROUGH OF BROOKLYN	1,249,650	2,262	21.6	1,128	50.0	210	365	9	25
BOROUGH OF QUEENS	172,472	310	21.0	148	50.0	21	320	....	3
BOROUGH OF RICHMOND	70,747	142	23.5	80	57.0	21	465	....	1
Oyster Bay	16,334	1	.....	0	.....	1	....	....	....
Hempstead	27,066	38	16.5	11	30.0	8	150	....	....
North Hempstead	12,048	24	.....	7	.....	7	....	....	....
Southold	8,301	6	.....	0	.....	3	....	....	....
Sag Harbor	2,000	3	.....	0	.....	2	....	....	....
Huntington	9,483	7	.....	2	.....	1	....	....	....
Brookhaven	14,592	15	.....	1	.....	5	....	....	....
YONKERS	47,931	90	21.5	52	57.7	8	320	....	1
Greenburg	15,564	15	.....	2	13.3	5	....	....	....
MOUNT VERNON	20,346	33	14.0	12	36.4	5	216	....	....
Port Chester	7,440	18	.....	9	50.0	4	550	....	1
Ossining	7,939	26	.....	10	38.0	8	200	....	....
NEW ROCHELLE	14,720	25	.....	10	40.0	2	280	....	1
Peekskill	10,358	22	.....	9	41.0	2	317	....	....
White Plains	7,900	11	.....	4	36.4	3	273	....	....
Rest of district	94,383	166	20.6	46	28.5	31	200	....	....
HUDSON VALLEY DISTRICT									
Totals	690,000	907	15.5	213	23.0	199	135	5	10
ALBANY	94,151	135	16.8	31	23.0	16	155	....	1
COHOES	24,000	31	15.0	9	33.0	4	40	....	....
TROY	75,057	132	20.7	33	24.5	14	200	1	1
WATERVLIET	14,321	25	.....	11	45.0	3	320	....	....
Green Island	4,770	6	.....	3	50.0	1	....	....	....
Hoosick Falls	5,671	4	.....	1	25.0	0	....	....	....
RENSSELAER	10,000	14	.....	5	35.7	4	215	1	....
Coxsackie	4,102	5	.....	0	.....	1	....	....	....
Catskill	5,486	3	.....	0	.....	2	....	....	....
HUDSON	9,528	11	.....	3	27.3	3	....	....	....
KINGSTON	24,535	33	.....	7	.....	5	....	....	....
Ellenville	3,000	4	.....	1	25.0	1	250	....	....
Marbletown	3,511	4	.....	0	.....	0	....	....	....
Rosendale	6,278	7	.....	0	.....	4	....	....	....
Esopus	4,907	2	.....	0	.....	0	....	....	....
Saugerties	3,700	6	.....	3	50.0	1	....	....	....
POUGHKEEPSIE	24,029	30	.....	8	26.6	6	....	....	1
Fishkill	13,016	21	.....	11	51.0	2	450	....	....
Wappinger Falls	3,504	3	.....	2	66.6	0	....	....	....
NEWBURGH	25,000	37	18.0	13	35.1	6	190	1	1
Port Jervis	9,385	17	.....	3	17.7	4	300	....	1
MIDDLETOWN	14,522	26	.....	8	30.5	3	230	....	....
Warwick	6,403	6	.....	3	.....	1	....	....	....
Goshen	4,564	7	.....	1	14.2	3	142	....	....

'ATE DEPARTMENT OF HEALTH

cities, villages and towns during July, 1902

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TIC DISEASES								OTHER CAUSES OF DEATH							
Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
43	17	87	142	1739	545	675	59	289	450	445	487	230	409	97	1,070
40	17	81	135	1655	519	632	56	235	415	408	426	209	380	70	1013
8	14	40	80	716	302	307	29	130	203	224	230	111	222	32	541
16	2	4	7	129	30	97	5	15	30	13	25	12	22	4	46
16	1	35	43	663	163	198	15	77	160	136	128	72	104	22	367
...	...	1	4	87	14	22	7	9	16	24	37	7	26	6	46
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...	...	...	...	7	3	2	...	8	3	2	6	1	...	1	...
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1	...	...	...	5	...	1	...	4	...	2	2	1	3	1	3
1	...	...	2	4	...	...	1	2	1	1	3	2	1	2	2
...	...	...	...	3	...	1	...	1	...	1	1	...	1	2	1
...	...	4	1	27	8	18	...	13	10	14	22	11	6	10	21
4	...	8	11	89	42	97	6	92	66	110	115	28	76	58	84
...	...	1	1	16	5	17	1	19	12	21	11	4	16	1	7
...	...	...	...	1	1	8	...	4	...	4	1	2	4	1	5
...	...	1	2	19	11	16	...	6	11	9	20	5	7	7	14
...	...	...	...	8	...	...	...	4	3	2	3	...	1	...	4
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...	...	1	2	1	1	2	...	4	...	...	2	1	2	...	...
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SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	3	....	0	....	0	333	....	....
Haverstraw	9,874	13	....	4	30.0	3	150	....	....
Nyack	4,275	....	....	....	....	....	....	....	....
Ramapo	7,502	12	....	4	33.3	3	85	...	1
Rest of district	268,970	310	14.0	49	16.5	109	110	2	4
ADIRONDACK AND NORTHERN DISTRICT									
Totals	394,772	385	12.0	80	21.5	82	75	3	5
WATERTOWN	21,700	23	13.5	10	43.5	3	130	....	....
Ellisburg	3,888	5	....	0	....	3	200	...	1
Cape Vincent	2,882	4	....	0	....	4	....	....	....
Clayton	4,313	7	....	0	....	2	142	1	....
OGDENSBURG	12,663	18	....	4	22.2	2	222	...	2
Gouverneur	6,000	5	....	0	....	1	....	....	....
Potsdam	3,843	....	....	....	....	....	....	....	....
Canton	6,387	8	....	0	....	2	....	....	....
Malone	5,935	13	....	6	47.0	2	75	....	....
Plattsburg	8,434	9	....	3	33.3	2	444	....	....
Glens Falls	12,613	17	....	4	24.0	1	....	....	....
Whitehall	4,377	7	....	0	....	5	....	....	....
Fort Edward	5,216	7	....	1	14.2	0	142	....	....
Sandy Hill	4,473	2	....	0	....	1	....	....	....
Granville	5,217	7	....	4	57.0	1	142	....	....
Greenwich	4,172	5	....	1	20.0	0	200	...	1
Lowville	3,746	4	....	0	....	0	....	....	....
Rest of district	278,984	244	10.5	47	20.0	53	50	2	1
MOHAWK VALLEY DISTRICT									
Totals	419,973	522	15.3	123	23.5	109	150	3	5
SCHENECTADY	47,625	70	17.3	36	51.5	5	385	...	1
Cobleskill	3,973	1	....	0	....	0	....	....	....
AMSTERDAM	20,929	36	20.0	16	44.4	7	300	...	1
Fort Plain	2,444	4	....	1	25.0	0	250	....	....
JOHNSTOWN	10,130	11	....	0	....	5	....	....	....
GLOVERSVILLE	18,349	18	12.0	4	22.2	1	222	...	1
LITTLE FALLS	10,381	8	....	3	37.5	1	250	...	1
Herkimer	5,555	1	....	0	....	0	....	....	....
Ilion	5,138	8	....	4	50.0	0	250	....	....
UTICA	56,383	100	20.0	21	21.0	16	120	1	....
Whitestown	6,235	2	....	0	....	1	....	....	....
ROME	15,343	22	....	2	11.1	4	50	...	1
Boonville	3,332	4	....	0	....	2	....	....	....
Camden	3,745	3	....	0	....	1	....	....	....
Waterford	6,157	9	....	2	22.2	3	110	....	....
Mechanicville	4,695	5	....	2	40.0	0	200	....	....
Ballston Spa	3,923	10	....	3	30.0	2	....	....	....
Saratoga Springs	12,409	25	....	8	32.0	5	240	....	....
Rest of district	183,228	185	12.0	21	11.0	56	50	2	....
SOUTHERN TIER DISTRICT									
Totals	429,530	423	12.0	69	16.2	135	75	2	6
BINGHAMTON	39,647	55	16.5	11	20.0	11	90	....	....
Owego	5,039	5	....	0	....	2	....	....	....
Candor	3,330	3	....	0	....	1	....	....	....
Waverly	4,465	6	....	0	....	2	....	....	....
ELMIRA	35,672	35	....	11	....	5	....	....	2

R JULY —(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
						1					1				1		
					1	1				1	2	3	1		2		2
							1	1		2		2	3			1	1
		3		4	5	14	12	29	3	26	21	51	40	10	31	30	24
1				3	5	13	26	52	3	24	25	48	59	18	29	28	43
					2	1	2	2			1	2	3	1	1	1	7
								1				1				2	2
							1						1			2	
										1	1				2	2	
						2	1			4		4	2	1	1		1
								2				1			1	1	
							1	1			1	1	2	1		1	
						1	1	2		3	2		1		1	2	
						4		1			1	1				1	1
							1	2		1	1	2	5	2	1		2
							1			1	1		2			2	
					1			4					2				
															1	1	
						1		1			1		1				3
								1			1			1			1
								2					2				
1				3	2	4	18	33	3	14	15	36	38	12	21	13	28
1	4	1	1		6	57	22	44	5	40	37	57	60	29	54	36	60
1	1	1				23	4	3	1	4	2	5	3	1	10	1	9
														1			
	2		1			7		3		5		2	5		2	2	6
						1		1			1	1					
							1	2			2	1	2	1		2	
	1				1	1	1			2		3	2	2	2	1	1
					1							2	1		1		2
								1									
						2					2	1					3
					1	10	3	10	2	7	6	11	16	6	11	4	12
								1						1			
								2		3	2	2	1	3	2	2	4
												2	1	1			
									1				1	1			
						1	1				1		2	1	1	2	
					1							1	1		1		1
							1	2			2		1			1	3
						6		5		2	1	1	2	2	1	2	3
					2	6	11	14	1	17	18	25	2	9	23	19	16
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	1		1	3	4	13	21	38	6	30	35	58	61	24	38	43	39
				1		4	3	6		5	3	4	12	3	5	5	4
											1	1	1		1	1	
													1			1	1
									1		1	1	2				1
					1	2	2	6		2	4	1	4	3		3	5

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
SOUTHERN TIER DIST.—(*Con.*)									
Horseheads	4,944	6	....	1	16.7	0	....	....	....
HORNELLSVILLE	12,000	14	....	0	....	2	70	....	1
Bath	5,000	....	....	....	....	....	....	....	....
CORNING	11,061	10	....	3	....	1	....	....	....
Wellsville	5,000	4	....	1	25.0	2	....	....	....
OLEAN	9,462	7	....	1	....	1	....	....	....
Salamanca	4,251	4	....	1	25.0	0	250	....	....
DUNKIRK	11,616	13	....	4	30.0	3	230	....	....
JAMESTOWN	22,892	24	12.5	4	16.7	4	40	....	....
Westfield	2,430	7	....	1	....	3	....	....	....
Fredonia	4,125	4	....	1	25.0	2	250	....	....
Rest of district	248,594	226	11.0	30	13.5	98	40	2	3
EAST CENTRAL DISTRICT									
Totals	402,660	409	12.7	70	17.0	137	75	3	4
SYRACUSE	108,374	113	12.5	36	31.5	24	150	2	....
Baldwinsville	3,000	2	....	0	....	1	....	....	....
De Witt	5,435	3	....	0	....	1	....	....	....
CORTLAND	9,014	8	....	0	....	3	....	....	....
Homer	2,381	3	....	1	33.3	1	....	....	....
ONEIDA	7,942	7	....	1	14.2	1	....	....	....
Hamilton	3,744	3	....	0	....	2	....	....	....
Cazenovia	3,830	11	....	1	9.0	7	....	....	....
Brookfield	2,726	4	....	1	25.0	3	....	....	....
Norwich	5,766	7	....	1	14.2	1	285	....	1
Oneonta	7,147	12	....	2	16.7	3	82	....	....
Worcester	2,409	2	....	0	....	2	....	....	....
Cooperstown	2,368	2	....	0	....	1	....	....	....
Walton	4,869	....	....	....	....	....	....	....	....
Delhi	3,243	1	....	0	....	1	....	....	....
Liberty	4,568	9	....	0	....	1	....	....	....
Rest of district	225,844	222	12.0	27	12.5	85	55	1	3
WEST CENTRAL DISTRICT									
Totals	316,000	336	13.0	48	14.5	106	40	....	1
AUBURN	30,345	36	13.0	7	20.0	9	84	....	....
ITHACA	13,136	13	....	2	15.3	1	....	....	....
Hector	4,137	5	....	0	....	0	....	....	....
Waterloo	4,256	8	....	1	12.5	3	....	....	....
Seneca Falls	6,519	4	....	0	....	0	....	....	....
GENEVA	10,433	17	....	6	35.2	3	115	....	....
Canandaigua	6,151	6	....	2	33.3	0	....	....	....
Manchester	4,733	6	....	1	16.7	3	....	....	....
Phelps	4,788	4	....	0	....	1	250	....	1
Penn Yan	4,650	7	....	3	42.8	3	....	....	....
Batavia	9,180	13	....	3	23.0	6	75	....	....
Dansville	3,633	5	....	0	....	2	....	....	....
Le Roy	3,144	6	....	0	....	2	....	....	....
Warsaw	4,341	6	....	0	....	2	....	....	....
Rest of district	206,500	200	12.0	23	11.5	71	35	....	....
LAKE ONTARIO AND WESTERN DISTRICT									
Totals	876,206	969	13.0	264	26.5	204	150	4	12
BUFFALO	352,387	413	14.0	138	33.5	58	202	4	2
Tonawanda	7,421	6	....	0	....	1	....	....	....
Amherst	4,223	2	....	1	50.0	0	....	....	....

FOR JULY —(*Continued*)

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	...	...	2	1	...	1	...	1	...	...	...	1
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...	...	1	...	1	1	2	2	11	15	3	15	17	41	33	16	19	26	18
...	...	...	...	3	3	3	16	16	27	3	42	38	61	47	32	32	35	44
...	...	...	...	1	2	...	12	3	10	1	14	6	12	14	9	5	6	16
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1	1	1	...	1	1	1	7	20	31	1	30	24	58	55	17	31	25	30
...	...	...	...	...	...	...	3	6	...	1	1	3	4	8	2	2	2	4
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...	7	3	9	...	10	8	104	60	74	3	85	66	116	116	56	76	63	97
...	...	...	5	...	4	6	63	36	33	1	25	28	43	51	19	29	20	44
...	...	...	...	...	...	...	...	...	2	...	2	...	...	...	...	2	...	...
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1

MONTHLY BULLETIN

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Continued.*)									
NORTH TONAWANDA	9,069	8	....	4	50.0	1	375	....	....
LOCKPORT	16,584	25	....	3	12.0	10	80	....	1
NIAGARA FALLS	19,457	39	23.5	24	62.0	2	350	....	3
Medina	4,716	3	....	1	33.3	1	333	....	....
Albion	4,477	1	....	0	....	1	....	....	....
Brockport	3,400	2	....	0	....	0	....	....	....
ROCHESTER	162,608	178	13.0	30	17.0	45	135	....	3
Palmyra	3,758	4	....	1	25.0	1	....	....	....
Newark	4,578	2	....	0	....	0	....	....	....
Lyons	5,824	4	....	0	....	3	....	....	....
Clyde	2,507	1	....	0	....	0	....	....	....
OSWEGO	22,200	26	14.0	4	15.5	4	40	....	1
FULTON	8,734	10	....	2	20.0	3	....	....	....
Richland	3,535	6	....	2	33.3	0	....	....	....
Rest of district	244,184	239	12.0	54	22.5	74	125	....	2
Totals for the state	7,467,050	10,938	17.5	4,132	38.5	1,565	250	51	107
Average for past five years	....	11,581	19.8	4,785	40.5	1,707	247	56	94

REMARKS—Pneumonia and Bright's disease caused respectively 535 and 591 deaths in June

JULY —(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases*	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
		1				2				1		1			1		2
						1		2		2	1	4	3	4	4	1	2
	3			4		4	4			2	1	1	5	1	4		7
						1						1					1
																1	
										1				1			
7				2	1	10	7	14		24	12	24	21	10	13	21	9
												1		1	1		1
								1		1							
											1	2	1				
														1			
								5		7	3	2	2	1	1	2	2
									1		2	2			3		2
								2			1	1					2
		3			1	23	13	14	1	20	17	34	33	18	18	18	24
34	76	57	23	115	180	2038	752	1,038	86	632	741	953	1,000	434	745	385	1,467
19	64	76	18	106	189	2216	696	1,061	77	1169	695	783	1,077	393	1007	400	1,358

400 and 600 in July.

MONTHLY BULLETIN OF THE

Abstract of deaths and their causes in the follo

[Cities are printed in SMALL CA

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes
MARITIME DISTRICT Totals	3,948,906	6,289	18.9	2,829	45.0	583	280
CITY OF NEW YORK Totals	3,632,501	5,765	18.6	2,605	45.2	410	275
BOROUGH OF MANHATTAN	1,895,491	3,042	20.0	1,348	45.0	183	260
BOROUGH OF THE BRONX	244,141	400	19.2	163	41.0	25	290
BOROUGH OF BROOKLYN	1,249,650	1,892	18.2	876	46.2	156	285
BOROUGH OF QUEENS	172,472	269	17.8	130	48.0	22	315
BOROUGH OF RICHMOND	70,747	162	26 9	88	55.0	24	425
Oyster Bay	16,334	29	.....	7	23.2	7	200
Hempstead	27,066	44	16.3	19	45.0	6	275
North Hempstead	12,048	27	.....	11	40.0	7	185
Southold	8,301	9	.....	6	66.6	1	555
Sag Harbor	3,500	8	.....	6	75.0	0	375
Huntington	9,483	8	.....	3	37.5	3	250
Brookhaven	14,592	14	.....	7	50.0	4	285
YONKERS	47,931	66	16.0	37	56.0	5	385
Greenburg	15,564	20	.....	7	35.0	1	200
MOUNT VERNON	20,346	34	20.3	15	42.8	6	410
Port Chester	7,440	17	.....	8	48.0	1	340
Ossining	7,939	22	.....	7	32.0	4	225
NEW ROCHELLE	14,720	19	.....	10	52.0	1	200
Peekskill	10,358	47	.....	25	55.5	5	450
White Plains	7,900	10	.....	2	20.0	3	200
Rest of district	94,383	150	18.3	54	36.0	19	400
HUDSON VALLEY DISTRICT Totals	690,000	931	15.6	287	30.7	184	235
ALBANY	94,151	126	15.0	23	18.5	16	160
COHOES	24,000	42	20.5	20	47.5	4	214
TROY	75,057	112	17.5	39	35.0	13	185
WATERVLIET	14,321	13	.....	5	37.5	0	300
Green Island	4,770	8	.....	6	66.6	0	111
Hoosick Falls	5,671	6	.....	1	16.7	1	167
RENSSELAER	10,000	16	.....	6	37.5	2	185
Coxsackie	4,102	7	.....	4	57.0	1	142
Catskill	5,486	7	.....	3	42.8	2	285
HUDSON	9,528	15	.....	5	33.3	3	200
KINGSTON	24,535	34	16.5	9	26.5	5	175
Ellenville	3,000	2	.....	1	50.0	1	500
Marbletown	3,511	2	.....	1	50.0	0	500
Rosendale	6,278	8	.....	4	50.0	0	500
Esopus	4,907	3	.....	0	.....	0	.....
Saugerties	3,700	4	.....	1	25.0	1	.....
POUGHKEEPSIE	24,029	30	14.5	12	40.0	6	266
Fishkill	13,016	13	.....	6	48.5	2	385
Wappinger Falls	3,504	5	.....	0	.....	0	.....
NEWBURGH	25,000	44	20.0	12	27.5	3	385
Port Jervis	9,385	17	.....	5	30.0	3	350
MIDDLETOWN	14,522	30	.....	11	36.6	5	466
Warwick	6,403	6	.....	5	83.5	0	166
Goshen	4,564	5	.....	1	20.0	2	200

rATE DEPARTMENT OF HEALTH

. *cities, villages and towns during August,* 1902

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TIC DISEASES					OTHER CAUSES OF DEATH										
Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
21	12	75	112	1376	494	616	54	258	469	412	450	229	391	86	1,064
18	11	70	103	1227	481	585	54	215	440	374	388	217	353	66	1,002
3	7	27	59	612	292	276	29	120	227	220	232	117	204	26	498
6	2	12	7	71	19	96	1	7	23	19	26	21	16	6	56
9	2	25	30	414	155	186	22	79	156	98	103	71	97	24	363
...	...	1	5	70	7	22	2	9	13	14	23	3	25	6	60
...	..	5	2	59	8	11	..	...	11	14	4	5	11	4	25
...	...	...	...	6	2	2	..	3	2	2	1	1	6	3	1
...	...	2	...	10	....	1	...	4	3	4	5	3	2	2	8
...	...	...	...	3	....	....	...	3	....	4	4	...	2	3	6
...	...	...	...	5	....	....	...	1	1	....	....	...	1	1	....
...	...	...	...	2	....	1	...	1	....	....	1	....	....	....	2
...	...	...	...	2	....	....	...	1	....	3	1	....	1	....	....
...	...	...	...	4	....	....	..	2	1	1	....	....	....	1	4
...	1	1	1	21	5	3	..	3	4	3	8	2	2	....	11
...	...	...	...	4	....	3	..	2	....	....	2	2	5	....	2
...	...	...	...	13	1	3	..	2	..	1	8	....	1	....	4
...	...	...	2	4	1	....	...	1	1	2	2	....	3	....	1
...	...	...	...	5	....	1	...	....	5	2	3	....	3	1	2
...	...	...	1	2	1	....	...	3	....	2	4	1	1	....	3
3	...	...	2	14	....	6	...	3	....	3	3	1	2	2	6
...	..	1	...	1	1	1	...	1	....	2	2	1	....	....	....
...	..	1	3	53	2	10	..	11	12	9	18	1	9	7	12
1	1	9	16	170	31	72	4	67	55	87	116	15	84	48	103
...	...	1	2	12	7	13	...	14	10	22	9	5	6	3	17
...	...	1	...	8	1	3	...	6	...	5	6	1	3	...	8
...	1	...	1	16	5	13	1	3	8	7	12	9	7	7	19
..	...	...	1	3	1	1	...	....	2	1	2	....	...	....	2
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...	...	..	1	5	...	4	1	3	1	1	7	1	2	2	3
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..	...	...	...	6	..	1	1	1	1		[illegible]		[illegible]	.	2
1	...	...	...	10	1	..		1	1	1	[illegible]	1	5	.	....
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.	.	...	...	1	..	..					[illegible]	1		..	....

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	9	.....	4	44.4	1	555	....	....
Haverstraw	9,874	13	.....	7	54.0	0	165	....	....
Nyack	4,275	2	.....	1	50.0	1	....	....	....
Ramapo	7,502	22	.....	7	31.8	9	685	....	1
Rest of district	268,970	330	14.2	87	26.6	103	200	2	3
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	403	12.0	86	21.5	114	125	1	5
WATERTOWN	21,700	17	10.0	6	35.3	2	353	....	1
Ellisburg	3,888	2	.....	0	.....	2	....	....	....
Cape Vincent	2,882	6	.....	2	33.3	1	166	....	1
Clayton	4,313	3	.....	1	33.3	1	333	....	....
OGDENSBURG	12,633	22	20.0	7	31.8	4	318	....	....
Gouverneur	6,000	5	.....	1	20.0	1	....	....	....
Potsdam	3,843	5	.....	1	20.0	1	....	....	....
Canton	6,387	7	.....	1	14.2	2	142	....	....
Malone	5,935	.....	.....	.....	.....	.....	....	....	....
Plattsburg	8,434	15	.....	9	60.0	0	200	....	....
Glens Falls	12,613	17	.....	1	60.0	4	....	....	....
Whitehall	4,377	6	.....	0	.....	3	166	....	....
Fort Edward	5,216	12	.....	5	42.5	2	333	....	....
Sandy Hill	4,473	5	.....	0	.....	3	....	....	....
Granville	5,217	15	.....	8	53.0	0	200	....	1
Greenwich	4,172	7	.....	0	.....	2	....	....	....
Lowville	3,746	5	.....	1	20.0	2	....	....	....
Rest of district	278,984	254	12.0	43	17.2	85	88	1	2
MOHAWK VALLEY DISTRICT Totals	419,973	526	15.5	162	30.8	109	215	4	7
SCHENECTADY	47,625	69	17.0	33	47.8	3	360	1	....
Cobleskill	3,973	3	.....	1	33.3	0	433	....	....
AMSTERDAM	20,929	32	18.0	13	40.0	4	400	....	....
Fort Plain	2,444	3	.....	0	.....	3	....	....	....
JOHNSTOWN	10,130	12	.....	2	16.6	3	333	....	1
GLOVERSVILLE	18,349	18	12.0	5	27.7	3	277	1	1
LITTLE FALLS	10,381	7	.....	2	28.5	1	428	....	1
Herkimer	5,555	10	.....	4	40.0	1	100	....	1
Ilion	5,138	4	.....	1	25.0	0	250	....	....
UTICA	56,383	104	21.5	30	29.0	16	180	....	1
Whitestown	6,235	8	.....	6	75.0	1	375	....	....
ROME	15,343	24	.....	6	25.0	9	125	....	1
Boonville	3,332	.....	.....	.....	.....	.....	....	....	....
Camden	3,745	7	.....	0	.....	3	....	....	....
Waterford	6,157	9	.....	2	22.2	2	111	....	....
Mechanicville	4,695	12	.....	10	82.5	1	333	....	....
Ballston Spa	3,923	9	.....	0	.....	2	....	....	....
Saratoga Springs	12,409	34	.....	10	30.0	51	182	....	1
Rest of district	183,228	161	10.0	37	23.1	51	150	2	....
SOUTHERN TIER DISTRICT Totals	429,530	496	14.0	102	20.5	135	175	....	11
BINGHAMTON	39,647	62	18.6	13	21.0	10	210	....	2
Owego	5,039	10	.....	3	30.0	3	400	....	....
Candor	3,330	3	.....	1	33.3	0	666	....	....
Waverly	4,465	5	.....	3	60.0	0	600	....	....
ELMIRA	35,672	57	19.0	18	31.5	14	210	....	1

AUGUST—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	2	3	...	...	...	...	...	1	1	...	...	1	1
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...	...	...	...	4	3	54	8	24	...	22	17	37	48	16	39	28	24
...	1	3	...	1	4	34	13	45	1	32	29	49	46	20	28	38	52
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...	...	3	...	1	1	13	10	33	1	22	20	32	29	13	15	29	30
...	3	1	...	3	7	88	27	36	3	51	34	51	74	17	47	35	37
...	2	...	...	1	3	18	5	3	1	4	6	4	5	...	11	1	4
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...	1	...	...	...	...	12	3	1	...	4	...	2	5	...	2	1	1
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...	...	...	...	...	...	2	...	1	...	...	1	4	5	...	...	...	2
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...	...	1	...	...	2	15	7	9	...	14	5	9	18	4	7	4	8
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...	...	...	...	...	...	2	2	3	...	5	...	...	4	1	1	4	1
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...	...	...	...	...	...	4	...	...	...	2	1	...	...	...	...	1	4
...	...	...	...	...	...	...	...	1	...	1	...	3	3	...	1	...	...
...	...	...	...	...	...	5	1	1	...	4	3	3	6	1	4	1	3
...	...	...	...	2	2	18	6	12	1	17	17	18	18	4	16	19	9
...	1	...	1	3	8	62	18	38	5	51	31	56	68	21	37	39	45
...	...	...	...	...	5	6	3	8	...	1	6	6	3	3	3	6	7
...	...	...	...	...	...	3	...	...	...	1	...	...	3	...	...	1	1
...	...	...	...	...	...	2	...	...	...	...	...	...	1	...	...	...	...
...	...	...	...	...	...	3	...	...	...	...	1	...	...	...	1	...	...
...	...	...	...	...	...	11	2	6	...	7	5	3	7	...	6	3	6

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	
SOUTHERN TIER DIST. (*Con.*)								
Horseheads	4,944	4	....	1	25.0	1	500	..
HORNELLSVILLE	12,000	7	....	1	14.2	1	425	..
Bath	5,000	....	....	....	....	....	...	
CORNING	11,061	12	....	2	16.6	4	..	
Wellsville	5,000	3	....	1	33.3	1	...	
OLEAN	9,462	11	....	5	45.4	1	18	
Salamanca	4,251	5	....	2	40.0	0	40	
DUNKIRK	11,616	29	....	9	30.0	3	20	.
JAMESTOWN	22,892	17	10.0	3	17.5	3	11	.
Westfield	2,430	2	....	0	....	1	...	
Fredonia	4,125	3	....	1	33.3	2	...	
Rest of district	248,594	266	12.5	39	14.5	91	13	
EAST CENTRAL DISTRICT Totals	402,660	511	15.8	114	22.5	146	17	
SYRACUSE	108,374	170	18.7	67	40.0	30	315	
Baldwinsville	3,000	5	....	1	20.0	2	40	.
De Witt	5,435	8	....	3	37.5	1	25	.
CORTLAND	9,014	7	....	0	....	4	...	..
Homer	2,381	3	....	1	33.3	2	...	..
ONEIDA	7,942	10	....	4	40.0	1	10	...
Hamilton	3,744	4	....	0	....	1	25	.
Cazenovia	3,830	....	....	....	....	....	....	
Brookfield	2,726	4	....	0	....	2	25	..
Norwich	5,766	13	....	1	7.7	3	77	
Oneonta	7,147	6	....	2	33.3	3	166	...
Worcester	2,409	4	....	0	....	1	...	
Cooperstown	2,368	4	....	0	....	1	...	...
Walton	4,869	10	....	2	20.0	2	100	
Dehli	3,243	2	....	1	50.0	1	...	.
Liberty	4,568	18	....	6	33.3	0	222	.
Rest of district	225,944	243	13.0	26	11.0	92	90	
WEST CENTRAL DISTRICT Totals	316,000	346	13.0	60	17.3	112	150	
AUBURN	30,345	52	20.0	18	24.6	9	425	.
ITHACA	13,136	21	....	5	23.8	3	333	.
Hector	4,137	1	....	0	....	1	....	
Waterloo	4,256	2	....	0	....	0	....	...
Seneca Falls	6,519	11	....	1	9.0	0	90	.
GENEVA	10,433	14	....	4	28.5	4	215	.
Canandaigua	6,151	11	....	2	19.0	4	90	.
Manchester	4,733	7	....	0	....	4	...	
Phelps	4,788	6	....	2	33.3	1	..	
Penn Yan	4,650	10	....	2	20.0	3	200	.
Batavia	9,180	12	....	3	25.0	6	333	1
Dansville	3,633	2	....	0	....	1	...	
Le Roy	3,144	2	....	0	....	2	.	
Warsaw	4,341	3	....	0	....	1	333	
Rest of district	206,500	192	11.0	23	13.0	73	75	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	1,130	15.2	384	34.0	188	264	
BUFFALO	352,387	520	17.4	215	41.3	52	300	
Tonawanda	7,421	17	....	6	33.0	3	165	.
Amherst	4,223	9	....	4	44.4	2	666	.

.UGUST — (*Continued*)

TIC DISEASES						OTHER CAUSES OF DEATH										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	2	...	1	...	...	...	...	1	...	...	...	...
...	...	...	...	...	2	...	1	...	2	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	2	...	2	...	2	2	1	3	...	...
...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1
...	...	...	...	...	2	...	...	...	1	...	2	3	1	...	...	2
...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	1	1
...	...	...	...	2	5	1	2	...	4	3	2	5	...	2	...	3
1	...	...	...	...	1	1	1	...	3	2	...	2	1	3	...	2
...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...
...	...	...	...	...	...	1	...	...	...	...	1	...	...	1	...	...
...	..	1	3	1	23	9	15	2	29	14	39	41	15	18	28	21
...	...	...	5	2	72	16	45	3	47	32	65	75	24	34	33	48
...	...	...	3	...	46	5	14	...	15	11	21	14	9	6	6	16
...	...	...	...	...	2	...	...	...	2	...	...	...	1	...	...	...
...	...	...	...	...	2	2	...	...	...	...	2	...	...	...	...	2
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...	...	...	...	...	1	1	1	...	1	...	1	...	...	2	...	3
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...	...	...	...	...	4	...	8	...	...	...	...	3	1	...	...	2
...	...	...	2	2	13	7	19	1	22	16	36	47	11	20	22	20
...	...	...	3	4	42	13	33	...	18	20	40	51	18	29	37	32
...	...	...	1	1	20	...	6	...	3	1	2	5	2	1	5	5
...	...	...	1	1	5	...	5	...	1	1	2	1	3	1	...	...
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...	...	...	...	...	3	1	2	...	...	...	2	4	...	1	...	1
...	...	...	...	...	1	...	...	...	1	1	2	3	...	1	1	1
...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	2	2
...	...	...	...	...	...	1	...	...	...	1	...	1	...	2	...	1
...	...	...	...	...	1	...	1	...	1	...	...	2	1	...	1	2
...	...	...	...	...	3	...	...	...	...	2	2	...	1	2	1	...
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...	...	...	1	2	7	11	17	...	8	14	25	32	9	18	24	20
2	2	. .	11	8	245	52	99	10	84	58	105	114	69	93	49	110
...	2	. .	4	5	130	35	47	5	32	22	41	50	28	35	17	55
...	...	...	1	...	1	...	...	.	4	1	1	1	2	2	...	3
...	...	...	...	...	6	...	1	..	..	...	...	...	1	1	...	...

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Continued*)									
NORTH TONAWANDA	9,069	16		7	43.5	3	435		
LOCKPORT	16,581	24		7	28.5	7			1
NIAGARA FALLS	19,457	45	27.0	21	45.0	1	350		5
Medina	4,716	9		2	22.2	2	222		
Albion	4,477	7		1	14.2	1	142		1
Brockport	3,400	5		1	20.0	1			
ROCHESTER	162,608	213	15.5	65	30.5	47	300		3
Palmyra	3,758	4		0		4			
Newark	4,578	8		2		3			
Lyons	5,824	6		1	16.6	1	166		
Clyde	2,507	4		0		2			
OSWEGO	22,200	30	16.0	1	3.5	8	100		
FULTON	8,734	5		0		1			
Richland	3,535	3		0		0			
Rest of district	244,184	205	10.0	54	26.5	54	180	2	3
Totals for the state	7,467,050	10,633	17.0	4,024	38.0	1,474	250	40	165
Average for past 5 years	....	10,687	18.4	4,218	39.4	1,419	250	46	161

REMARKS—There have been 10 deaths from smallpox in August of which 6 were in New York city and one each in Islip, Haverstraw, Rochester and Buffalo. In July there were 34 deaths, and prior to that there have been from 50 to 70 deaths monthly since last November. During July there were 285 cases of smallpox in the state in 14 localities, including New York city: in August there were 134 cases, and during September, up to the twenty-fifth, there have been reported but 45 new cases, of which 17 are outside New York city, in Buffalo, Niagara Falls, Rochester, Hopewell, Middletown, Rhinebeck, Stuyvesant, Forestport and Norwood. During the summer the chief points of prevalence were Rochester, Corning, Walton, Albany. Stockport, among negro brickyard laborers from the south: there were also cases in four towns in Essex and Franklin counties. With possible recurrence during the approaching lumbering

August — (*Concluded*)

rmotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	7	...	...	1	...	4	1	1	...	2	...	...
...	...	...	...	...	...	1	1	2	...	1	3	3	4	3	2	...	3
...	2	...	...	2	1	6	2	...	...	4	2	1	1	1	9	...	9
...	...	...	...	...	1	1	...	1	...	2	.	...	1	1	1	1	...
...	...	...	...	...	...	...	...	1	...	1	.	2	...	...	...	1	1
...	...	...	...	...	...	...	...	1	...	...	1	1	...	1	...	...	1
1	...	...	...	3	1	57	4	20	1	14	9	23	22	14	14	15	12
...	...	...	...	...	...	...	...	...	...	1	.	1	1	...	...	1	...
...	...	...	...	...	...	1	...	...	...	2	.	...	4	...	...	1	...
...	...	...	...	...	...	1	...	2	...	.	.	1	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	.	2	...	2	...	...	...	...
...	...	...	...	...	...	3	...	3	...	3	3	3	6	4	4	1	...
...	...	...	...	...	...	...	...	1	...	1		...	1	...	...	...	1
...	...	...	...	...	...	...	...	...	...	.		...	1	1	...	...	1
...	...	...	...	1	...	31	10	20	3	19	0	27	19	13	13	12	22
10	39	28	14	110	161	2089	664	984	80	608	728	865	994	443	733	365	1,491
8	28	41	13	108	177	2044	579	1,041	80	068	65	778	977	404	669	398	1,379

on in the Adirondacks of the epidemics of last winter, the Boards of Health of all towns hich there are lumber camps are again directed and urged to enforce the requirement, r an exacted penalty, that no men be employed in them who have not been satisfactorily inated. If this had been done early last winter there would have been a much less general prolonged prevalence of smallpox in that region. There is a general influx about this time e year of wood choppers from outside, especially from Canada and often from infected ities.

ıeumonia and Bright's disease caused respectively 335 deaths and 562 deaths during ust, both being less than in either of the preceding summer months.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	5,596	17.2	2,191	39.1	481	220	14	100
CITY OF NEW YORK									
Totals	3,632,501	5,101	17.0	2,004	40.0	394	224	12	96
BOROUGH OF MANHATTAN	1,895,491	2,728	17.5	1,100	40.3	191	218	8	42
BOROUGH OF THE BRONX	244,141	352	17.6	110	31.2	18	185	....	....
BOROUGH OF BROOKLYN	1,249,650	1,691	17.0	661	39.1	150	235	4	45
BOROUGH OF QUEENS	172,472	221	15.7	89	40.3	21	262	....	9
BOROUGH OF RICHMOND	70,747	109	18.7	44	40.0	14	245	....	....
Oyster Bay	16,334	7	.....	1	14.5	1	....	....	....
Hempstead	27,066	25	11.5	13	52.0	5	280	1	1
North Hempstead	12,048	13	.....	3	23.0	2	230	....	....
Southold	8,301	9	.....	2	22.2	3	222	....	....
Sag Harbor	3,500	8	.....	6	75.0	1	500	....	1
Huntington	9,483	19	.....	5	30.0	4	150	....	....
Brookhaven	14,592	30	.....	16	53.3	9	165	....	1
YONKERS	47,931	87	21.5	53	61.0	8	310	....	1
Greenburg	15,564	14	.....	5	.....	0	....	1	....
MOUNT VERNON	20,346	35	20.5	9	25.7	5	115	....	....
Port Chester	7,440	14	.....	7	50.0	0	142	....	....
Ossining	7,939	10	.....	2	25.0	1	125	....	....
NEW ROCHELLE	14,720	16	.....	11	.....	0	....	....	....
Peekskill	10,358	22	.....	6	27.3	3	225	....	....
White Plains	7,900	12	.....	4	33.3	3	85	....	....
Rest of district	94,383	174	22.3	44	25.4	42	150	....	....
HUDSON VALLEY DISTRICT									
Totals	690,000	854	15.0	200	23.5	192	150	4	12
ALBANY	94,151	119	15.2	25	21.0	15	84	....	2
COHOES	24,000	31	16.1	16	51.0	3	265	....	....
TROY	75,057	108	17.5	18	16.5	19	110	....	2
WATERVLIET	14,321	10	.....	4	.....	3	....	....	....
Green Island	4,770	5	.....	0	.....	0	....	....	....
Hoosick Falls	5,671	12	.....	2	.....	1	....	....	....
RENSSELAER	10,000	8	.....	3	37.5	0	125	....	....
Coxsackie	4,102	9	.....	3	.....	1	....	....	....
Catskill	5,486	4	.....	3	.....	0	....	....	....
HUDSON	9,528	11	.....	1	9.0	1	....	....	....
KINGSTON	24,535	34	17.0	7	20.5	9	205	....	1
Ellenville	3,000	3	.....	0	.....	2	....	....	1
Marbletown	3,511	4	.....	0	.....	2	....	....	....
Rosendale	6,278	3	.....	1	.....	0	....	....	....
Esopus	4,907	6	.....	1	.....	1	....	....	1
Saugerties	3,700	3	.....	1	.....	0	....	1	....
POUGHKEEPSIE	24,029	30	15.6	9	30.0	6	166	....	....
Fishkill	13,016	13	.....	5	.....	3	....	....	....
Wappinger Falls	3,504	3	.....	1	.....	0	....	....	1
NEWBURGH	25,000	38	18.6	10	26.3	7	200	1	2
Port Jervis	9,385	15	.....	2	13.3	2	200	....	....
MIDDLETOWN	14,522	20	16.5	3	15.0	7	100	....	1
Warwick	6,403	4	.....	2	.....	0	....	....	....
Goshen	4,561	12	.....	3	25.0	3	85	....	....

STATE DEPARTMENT OF HEALTH

cts, *cities, villages and towns during September*, 1902

in *italic* and towns in Roman type]

TIC DISEASES						OTHER CAUSES OF DEATH										
Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
26	5	5	64	112	890	610	595	51	264	434	429	430	110	336	218	882
26	5	5	60	109	810	591	550	47	226	406	372	372	91	306	199	799
9	2	3	31	38	454	338	259	24	116	220	200	201	11	184	154	427
7	..	1	6	7	45	34	98	5	11	21	17	18	4	18	7	53
8	3	1	17	53	257	195	171	18	85	134	117	126	65	85	29	269
1	...	...	1	11	34	18	11	...	9	24	25	14	7	11	8	36
1	...	...	5	...	20	6	11	...	5	7	13	13	4	8	1	14
...	...	...	...	...	....	....	2	...	....	....	1	....	1	1	....	2
...	...	...	...	...	5	1	1	1	1	....	1	5	2	1	1	4
...	...	...	...	...	3	....	1	...	1	3	....	....	1	3	....	1
...	...	...	...	...	2	....	1	...	1	....	2	....	....	1	1	1
...	...	...	...	...	3	....	....	...	1	1	....	2	....	....	....	....
...	...	...	...	...	2	1	2	...	1	3	2	....	1	1	2	3
...	...	...	...	...	4	1	1	..	3	3	1	2	1	2	2	9
...	...	...	...	3	23	7	8	1	6	4	8	12	2	1	1	10
...	...	...	...	...	1	1	1	...	2	....	1	2	....	2	....	3
...	...	...	2	...	2	3	4	..	4	....	3	4	3	2	2	6
...	...	...	1	...	1	....	....	1	2	....	1	2	....	2	....	4
...	...	...	...	...	1	....	2	...	....	1	2	1	2	....	....	1
...	...	...	...	...	3	....	2	...	....	1	....	1	....	1	....	8
...	...	...	...	...	5	....	1	...	4	1	1	4	2	1	1	2
...	...	...	...	...	1	....	....	...	....	....	2	1	1	1	2	4
...	...	...	1	...	24	5	19	1	12	11	32	22	3	11	7	25
1	...	1	8	14	88	54	81	1	80	59	96	114	35	56	54	93
...	...	...	2	1	3	15	16	...	13	16	15	7	4	8	4	11
1	...	...	3	...	4	3	2	...	1	1	1	3	3	1	....	8
...	...	...	...	2	8	7	14	...	16	7	18	12	2	5	7	8
...	...	...	...	...	2	....	....	...	1	2	1	1	1	....	....	2
...	...	...	...	...	....	....	1	...	....	1	2	....	1	....	....	....
...	...	...	...	...	....	....	2	...	1	3	1	2	1	1	....	1
...	...	...	...	1	....	....	1	...	1	....	1	1	....	1	....	2
...	...	...	...	2	....	1	....	...	....	....	....	2	1	1	....	2
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...	...	...	...	...	....	....	2	...	....	....	2	3	1	..	1	2
...	...	...	...	...	6	4	5	..	4	2	4	2	1	3	1	1
...	...	...	...	...	1	....	....	...	....	....	....	....	....	....	....	1
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...	...	...	1	...	2	1	....	...	1	2	2	1	....	1	....	2
...	...	...	...	...	....	...	....	...	....	....	....	2	....	....	....	....
...	...	...	...	...	5	....	4	...	4	3	2	3	....	4	2	8
...	...	...	...	1	2	....	2	...	2	....	1	3	....	2	1	1
...	...	...	...	...	1	1	3	...	3	2	....	5	1	1	2	...
...	...	...	...	...	1	1	....	...	....	....	1	1	....	....	....	....
...	...	...	...	...	1	....	1	...	2	....	2	1	2	1	1	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1 000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	5	.....	1	.....	3	.....	.....	.....
Haverstraw	9,874	16	.....	6	37.5	2	312	.....	.....
Nyack	4,275	.....	.....	.....	.....	.....	.....	.....	.....
Ramapo	7,502	13	.....	4	.....	5	.....	.....	.....
Rest of district	268,970	315	14.0	69	22.0	97	150	2	1
ADIRONDACK & NORTHERN DISTRICT									
Totals	394,772	427	13.0	109	25.3	101	170	3	8
WATERTOWN	21,700	28	15.7	8	28.5	4	215	.....	3
Ellisburg	3,888	3	.....	0	.....	3	.....	.....	.....
Cape Vincent	2,882	1	.....	.....	.....	.....	.....	.....	.....
Clayton	4,313	7	.....	2	.....	3	.....	.....	.....
OGDENSBURG	12,633	18	17.4	8	44.4	3	165	.....	1
Gouverneur	6,000	10	.....	2	20.0	2	200	.....	1
Potsdam	3,843	8	.....	3	37.5	2	125	.....	.....
Canton	6,387	6	.....	0	.....	3	165	.....	1
Malone	5,935	16	.....	7	43.7	4	185	.....	.....
Plattsburgh	8,434	9	.....	4	44.4	1	333	.....	.....
Glens Falls	12,613	12	.....	2	16.7	3	250	.....	.....
Whitehall	4,377	5	.....	1	.....	1	.....	.....	.....
Fort Edward	5,216	7	.....	1	14.2	2	.....	.....	.....
Sandy Hill	4,473	2	.....	1	.....	0	500	1	.....
Granville	5,217	5	.....	0	.....	1	500	.....	.....
Greenwich	4,172	3	.....	1	.....	2	.....	.....	.....
Lowville	3,746	6	.....	2	33.3	1	165	1	.....
Rest of district	278,984	280	12.5	66	23.0	66	155	1	2
MOHAWK VALLEY DISTRICT									
Totals	419,973	476	14.0	119	25.1	119	132	1	3
SCHENECTADY	47,625	48	12.3	26	53.4	3	400	.....	1
Cobleskill	3,973	12	.....	4	33.3	2	250	.....	.....
AMSTERDAM	20,929	29	17.0	5	17.0	3	135	.....	.....
Fort Plain	2,444	2	.....	0	.....	1	.....	.....	.....
JOHNSTOWN	10,130	6	.....	1	16.6	1	.....	.....	.....
GLOVERSVILLE	18,349	17	12.0	2	11.8	2	60	.....	.....
LITTLE FALLS	10,381	5	.....	0	.....	1	400	.....	.....
Herkimer	5,555	10	.....	4	40.0	4	.....	.....	.....
Ilion	5,138	5	.....	1	20.0	1	200	.....	.....
UTICA	56,383	96	20.5	26	27.0	17	100	.....	1
Whitestown	6,235	3	.....	1	.....	1	.....	.....	.....
ROME	15,343	19	.....	3	16.7	5	111	.....	.....
Boonville	3,332	3	.....	2	.....	1	.....	.....	.....
Camden	3,745	5	.....	0	.....	1	200	.....	.....
Waterford	6,157	5	.....	1	.....	1	.....	.....	.....
Mechanicville	4,695	5	.....	1	20.0	1	.....	.....	.....
Ballston Spa	3,923	4	.....	1	25.0	1	250	.....	.....
Saratoga Springs	12,409	27	.....	5	19.0	10	145	1	.....
Rest of district	183,228	175	12.0	36	20.5	63	100	.....	1
SOUTHERN TIER DISTRICT									
Totals	429,530	461	12.7	118	25.0	135	110	1	12
BINGHAMTON	39,647	60	18.5	14	23.3	10	135	.....	1
Owego	5,039	5	.....	0	.....	3	200	.....	.....
Candor	3,330	2	.....	1	50.0	0	.....	.....	.....
Waverly	4,465	5	.....	1	20.0	2	200	.....	.....
ELMIRA	35,672	38	13.0	9	23.6	9	75	.....	1

: SEPTEMBER — (*Continued*)

MOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	2	1
...	...	...	...	...	1	4	1	3	...	2	1	2	...	...	...	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	3	2	...	...	1	...	...	1	4	...	...	2
...	...	...	1	2	5	37	16	18	1	27	18	34	56	11	22	31	32
..	1	...	2	4	2	54	18	48	6	39	21	43	54	19	26	38	41
..	...	...	...	...	...	3	2	3	2	3	2	2	1	...	2	...	5
..	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...
..	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
..	...	...	...	...	...	...	...	...	...	1	...	2	2	...	1	...	1
..	...	...	...	...	...	2	1	2	...	1	1	3	3	...	2	1	1
..	...	...	...	...	...	1	...	1	...	1	...	1	1	...	1	1	2
..	...	...	...	...	...	1	...	...	1	...	...	2	2	...	...	1	1
..	...	...	...	...	...	...	...	...	...	1	...	1	1	1	...	1	...
..	...	...	...	...	...	3	1	1	...	2	2	...	3	...	1	...	3
..	...	...	...	1	...	2	...	...	...	...	...	2	...	1	...	1	2
..	...	...	...	...	...	3	...	3	...	1	2	...	...	1	1	...	1
..	...	...	...	...	...	...	2	1	...	...	...	...	...	...	1	1	...
..	...	...	...	...	...	...	1	2	...	...	1	...	1	...	2	...	...
..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
..	...	...	...	...	1	1	...	1	...	1	1	...	...	...	...	...	...
..	...	...	...	...	...	...	...	...	...	1	1	...	...	...	1	...	...
..	...	...	...	...	...	1	...	...	...	1	1	1	...	...	1	...	...
..	1	...	2	3	1	36	11	34	3	26	9	28	39	16	13	31	24
1	2	2	...	..	11	47	27	37	6	40	28	57	58	26	38	32	60
1	1	...	...	...	4	13	1	2	1	2	4	...	3	...	5	2	8
..	...	...	...	...	...	3	...	1	...	1	1	2	1	...	1	1	1
..	...	...	...	...	...	4	...	2	1	2	...	7	2	1	2	2	5
..	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...
..	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	...	...
..	...	...	...	...	...	1	2	1	..	...	2	2	1	3	2	1	2
..	...	...	...	...	2	...	...	...	..	...	1	...	...	...	2	...	...
..		...	...	...	...	...	1	1	...	1	1	1	1	...	...	2	2
..		...	...	...	...	1	...	...	...	...	...	...	...	1	1	...	1
..		2	...	...	...	6	6	14	...	10	6	11	15	3	6	3	13
..		...	...	...	...	...	...	1	.	1	...	...	...	...	...	...	1
..		...	...	...	1	1	1	...	...	...	...	4	3	1	3	...	5
..		...	...	...	...	1	...	...	...	...	...	...	1	...	...	1	...
..		...	...	...	1	...	...	...	...	1	...	2	...	1	...	...	...
..		...	...	...	...	...	...	1	...	...	...	1	1	...	1	...	1
..		...	...	...	...	...	...	1	...	1	1	1	...	...	...	...	1
..		...	...	...	...	1	2	...	...	...	...	...	...	...	1	...	...
..		...	...	...	1	2	3	2	.	2	1	3	5	2	2	3	...
..		...	...	...	2	14	11	11	4	17	9	20	22	14	12	17	20
..		...	2	1	8	62	23	24	3	50	27	47	72	19	28	39	43
..		...	...	...	3	4	3	7	.	2	2	5	11	2	3	6	11
..		...	...	...	1	...	1	...	...	...	1	2	...	...	...	...	...
..		...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
..		...	...	...	...	1	...	...	...	...	...	1	1	...	...	2	...
..		...	...	...	...	2	3	...	...	8	1	3	4	2	3	5	6

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
Horseheads	4,944	6	.....	3	50.0	1	166	....	....
HORNELLSVILLE	12,000	10	.....	2	20.0	2	300	....	....
Bath	5,000	3	.....	1	33.3	0	333	....	....
CORNING	11,061	11	.....	2	18.2	2	....	....	....
Wellsville	5,000	6	.....	1	16.6	2	166	....	1
OLEAN	9,462	10	.....	3	30.0	3	300	....	....
Salamanca	4,251	7	.....	2	28.5	1	425	....	2
DUNKIRK	11,616	27	.....	9	33.3	3	260	....	1
JAMESTOWN	22,892	29	15.5	11	40.0	7	230	....	....
Westfield	2,430	6	.....	1	16.7	2	....	....	....
Fredonia	4,125	3	.....	2	66.6	1	....	....	....
Rest of district	248,594	233	12.0	55	23.5	88	200	1	6
EAST CENTRAL DISTRICT Totals	402,660	460	14.5	94	21.0	139	145	2	8
SYRACUSE	108,374	123	14.0	37	30.0	19	135	1	....
Baldwinville	3,000	8	.....	2	25.0	2	125	....	....
De Witt	5,435	8	.....	0	.....	0	125	....	1
CORTLAND	9,014	16	.....	2	12.5	5	125	....	....
Homer	2,381	2	.....	0	.....	1	....	....	....
ONEIDA	7,942	11	.....	2	19.0	2	90	....	....
Hamilton	3,744	3	.....	0	.....	1	....	....	....
Casenovia	3,830	7	.....	1	14.2	2	....	....	....
Brookfield	2,726	4	.....	2	50.0	1	250	....	....
Norwich	5,766	7	.....	0	.....	4	....	....	....
Oneonta	7,147	4	.....	2	50.0	0	500	....	1
Worcester	2,409	3	.....	1	33.3	0	333	....	1
Cooperstown	2,368	5	.....	1	20.0	0	....	....	....
Walton	4,869	4	.....	1	25.0	2	250	....	....
Delhi	3,243	2	.....	0	.....	1	....	....	....
Liberty	4,568	11	.....	1	9.0	0	90	....	....
Rest of district	225,844	242	13.0	42	18.5	99	160	1	5
WEST CENTRAL DISTRICT Totals	316,000	419	16.5	89	20.3	130	150	....	4
AUBURN	30,345	51	20.0	17	34.0	8	300	....	....
ITHACA	13,136	24	.....	5	21.0	8	166	....	....
Hector	4,137	7	.....	4	57.0	1	285	....	....
Waterloo	4,256	7	.....	2	28.5	1	....	....	....
Seneca Falls	6,519	5	.....	1	20.0	2	200	....	....
GENEVA	10,433	18	.....	6	33.3	6	222	....	....
Canandaigua	6,151	8	.....	4	50.0	2	500	....	1
Manchester	4,733	7	.....	0	.....	0	200	....	1
Phelps	4,788	7	.....	2	28.5	0	142	....	....
Penn Yan	4,650	9	.....	1	11.1	2	....	....	....
Batavia	9,180	13	.....	4	30.5	1	230	....	....
Dansville	3,633	7	.....	3	.....	2	....	....	....
Le Roy	3,144	5	.....	1	20.0	2	400	....	1
Warsaw	4,341	9	.....	2	22.2	2	....	....	....
Rest of district	206,500	242	14.0	37	15.0	93	125	....	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	989	13.5	298	30.0	206	300	5	32
BUFFALO	352,387	410	14.0	138	33.5	56	235	3	17
Tonawanda	7,421	10	.....	4	40.0	0	200	....	1
Amherst	4,223	3	.....	1	33.3	1	....	....	....

R SEPTEMBER —(*Continued*)

YMOTIC DISEASES								OTHER CAUSES OF DEATH									
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
						1		1		2		1					1
						3				1	2	1	1		1		1
						1				1							1
							1	1		1	1	2	2	1	1	1	
							1					1				2	1
						3	1		1		1		2			1	1
						1	1						1			2	
					3	3	2	1	1	3	2	1	2	1	2	1	4
						7		2		3	1	3	5	1	3	1	3
											3		3				
										1		1			1		
			2	1	1	36	9	12	1	28	13	26	40	11	14	18	14
			1	1	3	52	22	49	4	33	32	55	63	27	24	38	46
				1	2	13	6	8	2	13	14	15	11	6	6	7	18
						1		1		1		1	1		2		1
								2				1	1	1	2		
						2	1	2		2	2	3	1	1		2	
								1							1		
						1	2			1		3	2			1	1
										1			1	1			
										1		1	3	1			1
						1				1		2					
							1					1	1		1	2	1
						1					1						1
								1			1						
								1			1				1		2
						1					1			1			1
													1			1	
						1		6				1	1	1	1		
			1		1	31	12	27	2	13	12	27	40	15	10	25	20
			2	2	1	60	17	18	3	38	25	58	64	24	19	39	44
						15	3	2		5		8	6	2	1	2	7
						4	1				1	7	2	1	4		4
						2	1						1	1			2
							1			2	1	2					1
						1						1	1	1		1	
						4				3	1	2	1		2	1	4
						3				2		1				1	
											2	1	1	1			1
						1	1	2		1		1					1
								2		1	1	1			1	7	1
						3				3		1		1	2	1	1
						2					1		2				2
						1						1	1	1			
							1	1		1		3	1			1	1
			2	2	1	24	9	11	3	20	18	29	42	16	8	20	19
	1		2	3	15	137	[illegible]	65	6	73	[illegible]	114	141	[illegible]	62	[illegible]	[illegible]
				1	9	65	32	29	4	2[illegible]	24	45	[illegible]	[illegible]	[illegible]	[illegible]	47
													7				2
															3		1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NORTH TONAWANDA	9,069	9	....	6	66.6	0	222	....	....
LOCKPORT	16,581	22	16.0	4	18.2	6	136	....	1
NIAGARA FALLS	19,457	33	20.5	11	33.3	2	385	....	5
Medina	4,716	5	....	2	40.0	2	....	....	....
Albion	4,477	5	....	2	40.0	1	200	....	....
Brockport	3,400	4	....	0	....	1	500	....	....
ROCHESTER	162,608	181	14.0	41	22.5	40	110	....	1
Palmyra	3,758	6	....	0	....	2	166	....	....
Newark	4,578	....	....	....	....	....	....	....	....
Lyons	5,824	6	....	3	50.0	0	333	....	....
Clyde	2,507	3	....	1	33.3	2	333	....	....
OSWEGO	22,200	32	17.5	12	37.5	10	185	....	....
FULTON	8,734	7	....	4	57.0	0	285	....	....
Richland	3,535	4	....	1	25.0	1	250	....	1
Rest of district	244,184	249	12.0	68	28.0	82	180	2	6
Totals for the state	7,467,050	9,682	15.8	3,218	32.6	1,504	195	30	179
Average for past five years	....	10,155	17.8	3,650	36.0	1,490	215	44	230

REMARKS.—The record of the month for healthfulness has been good. There was a low summer mortality, and September follows with 500 fewer deaths than the average of past years. The saving has been in diarrheal and digestive diseases. Acute respiratory diseases which had an excessive mortality through the summer, have continued about ten per cent above the normal rate for the month. Diseases of the kidney have likewise been moderately excessive. There were 417 deaths from pneumonia, and 385 from Bright's disease. Acute diarrheal diseases have been returned under various phases and names. The nomenclature of 470 death returns have the following numerical ratio Cholera infantum, 227 deaths; gastro-enteritis, 57; entero-colitis, 43; enteritis, 28; ileo-colitis, 16; colitis, 7; dysentery, 68; diarrhea, 24. Of the last they were variously named infantile diarrhœa, cholera morbus, choleraic diarrhœa, summer complaint or summer diarrhea, bowel trouble and diarrhea. Of these 11 occurred in infancy, 5 in middle life, and 8 past the age of 60 years. Various contributory causes of death were given. There were but 17 of the entire number in which meningitis was given, and 18 were complicated with convulsions, these sometimes being noted as the chief cause of death. Dentition, lack of proper food, mal-assimilation, milk infection, nutrition, marasmus, stomatitis are frequently noted as attendant and contributory causes of death. Of the 227 deaths from cholera infantum, 167 occurred in the first year of life, 34 in the second year, 15 in the third year, and 2 were so-called in whom death occurred at the age of five years. Of deaths returned as from gastro enteritis, 40 were in the first year of life, 2 in the second.

SEPTEMBER —(*Concluded*)

YMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	2	....	....	....	....	....	....	1	1	2	....	3
....	....	....	....	....	....	2	1	1	....	3	....	3	3	2	....	1	5
....	1	....	....	....	1	6	5	2	1	3	1	1	1	....	3	....	3
....	....	....	....	....	....	....	1	....	....	1	....	....	3	....	....	....	....
....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	....	1	1
....	....	....	....	....	....	2	....	....	....	1	....	....	....	....	....	....	1
....	....	....	2	....	....	17	11	11	1	19	10	23	25	12	20	16	13
....	....	....	....	....	1	....	....	1	....	....	....	1	1	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	2	....	....	....	2	1	....	....	....	1	....	....
....	....	....	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....
....	....	....	....	....	....	6	4	1	....	1	7	3	3	2	....	2	3
....	....	....	....	1	....	1	....	1	....	1	1	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	1
....	....	....	....	1	4	31	8	18	....	24	14	36	42	17	12	20	14
6	31	7	15	83	166	1390	835	917	80	622	686	899	995	314	589	512	1,306
2	24	22	11	81	183	1491	707	1,004	64	998	665	786	970	379	659	410	1,375

40, and 13 past 60 years, 30 of the 57 having no contributory cause given. Entero colitis
sed 30 deaths in infancy, 8 in childhood (between 2 and 10 years of age), and 5 past 60.
28 deaths from enteritis, 10 fell in the first year of life, 6 in the second, 2 in middle life,
10 past 60 years of age. Two were defined as catarrhal enteritis and 1 as likewise cholera
ntum. Ileo-colitis was given as a cause of death only in infancy and early childhood.
y were all attended with meningitis, convulsions, marasmus and mal-assimilation. Six
noted as ulcerative ileo-colitis, all occurring at one locality on Long Island. Colitis,
etimes noted as acute catarrhal and once as ulcerative, caused 7 deaths, 4 in infancy and
st 60 years of age. Dysentery was given as the cause of 68 deaths, 15 per cent of the whole
nber. They were distributed in all parts of the State, and in no special locality, 4 occurring
Westchester county and 2 on Long Island. Bloody dysentery was the term applied to 2,
intestinal hemorrhage occurred in 3 others. Meningitis, convulsions, improper food and
lity were given as contributory, but with 50 no comment was made. Thirteen of the
ths were in the first year of life, 9 at 4, 3 at 10, 12 between 30 and 50, and 31 were past 60
rs of age. Of the entire number of 470 deaths for diarrheal diseases occurring in all parts
he state, both rural and urban (New York city and Buffalo not being included), 352 occurred
he first year of life, 22 in the second year, 6 in youth, 20 in middle life and 70 in old age
majority of the last being past the age of 70 years.

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	5,446	16.3	1,770	32.5	512	128	21	126
CITY OF NEW YORK									
Totals	3,632,501	5,030	16.3	1,647	30.0	431	145	20	121
BOROUGH OF MANHATTAN	1,895,491	2,837	17.6	961	33.5	216	135	16	66
BOROUGH OF THE BRONX	244,141	337	16.2	73	21.6	32	95	....	4
BOROUGH OF BROOKLYN	1,249,650	1,541	15.0	517	33.5	147	172	2	45
BOROUGH OF QUEENS	172,472	222	15.2	74	33.3	19	145	2	2
BOROUGH OF RICHMOND	70,747	93	15.4	22	23.5	17	182	....	4
Oyster Bay	16,334	.....	.....	.....	.....	.....	....	....	....
Hempstead	27,066	42	.....	12	.....	10	....	....	....
North Hempstead	12,048	16	.....	5	31.5	3	....	....	....
Southold	8,301	11	.....	5	45.4	3	300	....	....
Sag Harbor	3,500	3	.....	0	.....	1	....	....	....
Huntington	9,483	6	.....	2	.....	1	....	....	....
Brookhaven	14,592	6	.....	1	.....	1	....	....	....
YONKERS	47,931	75	18.0	29	38.5	8	160	....	1
Greenburg	15,564	20	.....	7	35.0	3	200	1	....
MOUNT VERNON	20,346	20	.....	9	45.0	2	150	....	....
Port Chester	7,440	14	.....	4	28.5	2	140	....	....
Ossining	7,939	14	.....	2	14.2	3	142	....	1
NEW ROCHELLE	14,720	24	.....	10	41.8	3	85	....	....
Peekskill	10,358	19	.....	4	21.0	4	210	....	....
White Plains	7,900	13	.....	3	23.0	3	75	....	....
Rest of district	94,382	133	16.5	30	22.5	34	125	....	3
HUDSON VALLEY DISTRICT									
Totals	690,000	846	14.5	145	17.2	188	100	1	20
ALBANY	94,151	136	18.0	13	8.5	16	88	....	4
COHOES	24,000	34	17.0	9	26.5	3	118	....	....
TROY	75,057	109	17.1	23	20.0	11	35	1	....
WATERVLIET	14,321	16	.....	4	25.0	2	125	....	....
Green Island	4,770	8	.....	1	12.5	4	....	....	....
Hoosick Falls	5,671	3	.....	0	.....	0	....	....	....
RENSSELAER	10,000	15	.....	5	31.5	3	200	....	1
Coxsackie	4,102	8	.....	4	50.0	2	375	....	....
Catskill	5,486	7	.....	1	14.2	1	142	....	....
HUDSON	9,528	12	.....	0	.....	3	....	....	....
KINGSTON	21,535	31	15.0	10	33.0	7	100	....	....
Ellenville	3,000	6	.....	0	.....	5	500	....	1
Marbletown	3,511	2	.....	0	.....	0	....	....	....
Rosendale	6,278	6	.....	1	16.7	1	500	....	1
Esopus	4,907	4	.....	2	.....	1	....	....	....
Saugerties	3,700	7	.....	0	.....	0	....	....	....
POUGHKEEPSIE	24,029	35	17.2	8	23.0	9	115	....	....
Fishkill	13,016	20	.....	2	10.0	3	150	....	1
Wappinger Falls	3,504	1	.....	1	.....	0	....	....	....
NEWBURGH	25,000	31	14.5	7	31.6	4	160	....	3
Port Jervis	9,385	18	.....	3	16.7	1	111	....	....
MIDDLETOWN	14,522	13	.....	3	23.0	7	75	....	1
Warwick	6,403	6	.....	3	50.0	2	166	....	....
Goshen	4,564	5	.....	0	.....	1	....	....	....

YORK STATE DEPARTMENT OF HEALTH

districts, cities, villages and towns during October, 1902

villages in *italic* and towns in Roman type]

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
13	2	38	7	2	42	140	403	701	672	37	264	499	542	473	212	319	102	831
13	2	37	7	2	33	132	374	674	638	34	234	463	496	409	195	300	82	761
7	...	20	4	2	15	58	206	413	341	17	132	274	273	236	102	182	36	437
2	...	4	2	...	...	6	11	28	91	3	8	28	29	25	16	25	5	44
4	2	11	1	...	15	58	128	210	168	9	73	146	158	111	65	66	35	234
...	...	1	...	...	...	7	20	14	27	3	14	10	24	28	8	21	1	40
...	...	1	...	...	3	3	6	9	8	2	7	5	12	9	4	6	5	9
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	2	3	...	3	...	...	3	4	7	6	1	2	3	8
...	...	...	...	...	...	...	...	1	1	...	3	3	...	3	1	...	2	2
...	...	...	...	...	...	...	3	1	...	...	1	1	...	2	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	1
...	...	...	...	...	...	...	1	1	2	...	1	...	1	...	...	...	...	...
...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	1	...	1	1
...	...	...	...	...	1	1	9	9	5	1	2	7	7	13	3	1	1	14
...	...	...	...	...	...	...	...	1	2	...	2	3	1	3	...	1	2	4
...	...	...	...	...	1	...	2	2	3	...	3	3	...	2	1	...	...	3
...	...	...	...	...	...	1	1	2	1	...	...	2	1	...	1	2	1	2
...	...	...	...	...	...	1	...	...	4	...	...	2	2	...	2	1	...	1
...	...	...	...	...	2	...	...	1	1	...	3	2	2	2	...	2	1	8
...	...	...	...	...	2	...	2	2	1	...	...	1	4	2	2	1	...	2
...	...	...	...	...	...	1	...	...	...	...	...	...	1	6	1	...	2	2
...	...	1	...	...	1	1	11	4	13	2	10	8	20	23	4	9	7	16
4	...	...	1	...	8	18	32	70	92	3	61	77	129	103	47	43	43	94
...	...	...	...	...	2	4	2	14	25	1	9	17	23	4	7	9	3	12
...	...	...	...	...	1	..	3	6	3	...	4	3	4	4	...	...	1	5
...	...	...	...	...	...	...	3	13	17	...	6	9	16	17	4	4	3	16
...	...	...	...	...	1	...	1	2	1	...	3	2	1	...	...	...	1	1
...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1		1	1
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1					2		...	1	4	...	3	5	5	3	2	1	2	5
1							...	...	2	...	...	2	4	4	2	...	1	2
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...							2	4	3	...	...	3	2	5	1	4	...	4
...						2	...	1	3	...	...	...	3	2	...	2	1	4
...							...	1	1	...	3	1	2	1	1	1	...	1
...							1	...	...	...	...	...	...	1	1	...	2	1
...	...	...	...	...		...	...	1	1	...	...	...	...	1	1	1	...	...

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	4	.....	2	50.0	2	250	....	....
Haverstraw	9,874	10	.....	6	60.0	1	200	....	....
Nyack	4,275	5	.....	0	.....	1	....	....	....
Ramapo	7,502	12	.....	1	8.5	5	85	....	....
Rest of district	268,970	282	13.0	36	12.8	93	92	....	8
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	418	12.5	90	21.7	116	130	1	14
WATERTOWN	21,700	36	19.5	12	33.3	9	55	....	1
Ellisburg	3,888	4	.....	0	.....	3	250	....	1
Cape Vincent	2,882	3	.....	1	.....	2	....	....	....
Clayton	4,313	3	.....	1	33.3	1	....	....	....
OGDENSBURG	12,633	12	.....	1	8.5	5	85	1	....
Gouverneur	6,000	13	.....	5	39.0	3	390	....	2
Potsdam	3,843	5	.....	1	20.0	2	400	....	1
Canton	6,387	6	.....	1	16.7	3	167	....	....
Malone	5,935	8	.....	4	50.0	0	375	....	....
Plattsburg	8,434	14	.....	3	21.4	3	70	....	....
Glens Falls	12,613	12	.....	3	25.0	1	166	....	....
Whitehall	4,377	1	.....	1	.....	0	....	....	....
Fort Edward	5,216	7	.....	3	42.8	1	142	....	....
Sandy Hill	4,473	4	.....	0	.....	2	....	....	....
Granville	5,217	10	.....	3	30.0	2	100	....	....
Greenwich	4,172	7	.....	2	28.5	3	285	....	....
Lowville	3,746	6	.....	0	.....	4	....	....	....
Rest of district	278,984	267	12.0	49	18.5	72	118	....	9
MOHAWK VALLEY DISTRICT Totals	419,973	499	15.0	104	21.0	133	125	5	10
SCHENECTADY	47,625	57	14.0	27	47.5	4	263	....	....
Cobleskill	3,973	15	.....	2	13.3	7	333	1	....
AMSTERDAM	20,929	23	13.0	7	30.0	3	260	....	....
Fort Plain	2,444	1	.....	0	.....	0	....	....	....
JOHNSTOWN	10,130	11	.....	0	.....	6	....	....	....
GLOVERSVILLE	18,349	20	12.5	3	15.0	6	50	1	1
LITTLE FALLS	10,381	9	.....	2	22.2	2	....	....	....
Herkimer	5,555	4	.....	2	.....	0	....	....	....
Ilion	5,138	2	.....	0	.....	0	....	....	....
UTICA	56,383	90	18.7	13	14.5	21	45	....	....
Whitestown	6,235	5	.....	2	.....	1	....	....	....
ROME	15,343	17	.....	5	30.0	3	175	1	....
Boonville	3,332	2	.....	1	.....	1	....	....	....
Camden	3,745	8	.....	2	25.0	3	....	....	....
Waterford	6,157	4	.....	0	.....	0	....	....	....
Mechanicville	4,695	3	.....	2	.....	0	....	....	....
Ballston Spa	3,923	3	.....	1	.....	0	....	....	....
Saratoga Springs	12,409	18	.....	5	27.7	4	55	....	....
Rest of district	183,228	207	13.0	30	16.0	72	130	2	9
SOUTHERN TIER DISTRICT Totals	429,530	503	13.5	95	19.0	154	110	4	9
BINGHAMTON	39,647	52	15.6	7	13.5	17	58	....	1
Owego	5,039	7	.....	0	.....	1	....	....	....
Candor	3,330	7	.....	1	14.2	0	....	....	....
Waverly	4,465	4	.....	0	.....	0	....	....	....
ELMIRA	35,672	35	12.0	11	33.0	4	117	....	....

R OCTOBER —(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	1	1
...	...	...	...	2	...	...	1	1	...	3	...	...	2	1	...	...	...
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...	...	...	...	...	1	...	...	1	...	1	1	2	3	1	1	1	...
...	...	1	...	...	4	12	18	21	1	15	27	50	48	18	14	20	24
...	3	2	1	...	3	31	25	45	1	40	20	48	52	20	24	39	49
...	...	...	...	...	1	...	3	...	...	8	1	5	4	3	3	2	5
...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	1	...
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...	...	...	...	...	...	...	3	...	...	...	1	2	...	2	1	1	1
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...	...	...	...	...	...	1	...	...	...	1	1	1	...	1	1	...	...
...	...	2	...	...	...	1	...	...	...	1	1	1	1	...	...	...	1
...	...	...	...	...	...	1	...	4	...	...	...	1	3	2	...	2	1
...	2	...	...	...	...	...	...	2	...	3	1	1	...	1	1	1	...
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...	...	...	...	...	...	2	...	...	...	...	...	...	1	...	1	1	2
...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	2	...
...	1	...	1	...	...	21	16	38	1	22	14	28	40	7	15	24	30
...	8	2	...	1	13	23	40	43	4	41	37	52	72	20	26	43	59
...	4	1	...	...	5	5	7	1	1	4	4	4	5	2	3	1	10
...	...	...	...	...	...	4	...	...	...	1	2	1	2	...	1	3	...
...	4	...	...	...	1	1	2	3	1	2	1	2	1	...	1	1	3
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
...	...	...	...	...	1	...	1	1	...	...	1	1	3	...	...	3	...
...	...	...	...	...	...	...	1	1	...	2	...	2	4	1	1	4	2
...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	2	2	1
...	...	...	...	...	...	...	...	1	1	...	...	...	1	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
...	...	1	...	...	...	3	6	10	...	9	4	16	14	8	5	3	11
...	...	...	...	...	...	...	1	1	...	1	...	1	...	...	...	...	1
...	...	...	...	...	...	2	1	2	...	1	...	2	4	1	...	1	2
...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...
...	...	...	...	...	...	...	...	...	...	1	1	2	2	...	...	1	1
...	...	...	...	...	...	...	...	...	...	1	2	1	...	...	...	...	...
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...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	1
...	...	...	...	...	...	1	2	2	...	1	4	3	1	...	...	2	2
...	...	...	...	1	6	7	17	20	1	16	17	14	34	7	11	22	23
...	4	...	1	2	14	22	36	40	3	43	25	58	83	27	34	35	63
...	...	...	...	...	2	...	5	5	...	8	5	...	8	3	2	7	6
...	...	...	...	...	...	...	1	...	1	...	...	1	1	...	2	...	1
...	...	...	...	...	...	...	2	...	...	1	...	1	2	...	...	...	1
...	...	...	...	...	...	...	...	2	...	...	...	...	2	2	...	...	...
...	...	...	...	...	2	2	...	3	...	1	2	4	8	2	2	1	8

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
SOUTHERN TIER DIST.- (*Con.*)									
Horseheads	4,914	4	....	0	....	1	....	....	....
HORNELLSVILLE	12,000	23	....	3	13.5	3	215	....	2
Bath	5,000	3	....	0	....	1	....	....	....
CORNING	11,061	12	....	2	16.6	1	....	....	....
Wellsville	5,000	10	....	2	20.0	4	200	....	....
OLEAN	9,462	15	....	4	23.3	2	200	1	1
Salamanca	4,251	9	....	3	33.3	3	230	....	....
DUNKIRK	11,616	14	....	6	43.0	2	215	....	....
JAMESTOWN	22,892	26	13.5	8	30.0	5	77	....	....
Westfield	2,430	8	....	0	....	3	....	....	....
Fredonia	4,125	8	....	2	25.0	2	375	....	....
Rest of district	248,594	266	13.0	46	17.2	105	100	3	5
EAST CENTRAL DISTRICT Totals	402,660	461	14.0	69	15.3	149	90	....	5
SYRACUSE	108,374	119	13.0	19	16.5	22	70	....	2
Baldwinsville	3,000	....	....	....	....	....	....	....	....
DE WITT	5,435	3	....	1	33.3	2	....	....	....
CORTLAND	9,014	9	....	0	....	2	....	....	....
Homer	2,381	4	....	1	25.0	2	250	....	....
ONEIDA	7,942	3	....	0	....	6	....	....	....
Hamilton	3,744	4	....	0	....	3	....	....	....
Cazenovia	3,830	8	....	....	....	3	....	....	....
Brookfield	2,726	3	....	0	....	1	....	....	....
Norwich	5,766	8	....	2	25.0	3	125	....	1
Oneonta	7,147	10	....	0	....	2	100	....	....
Worcester	2,409	3	....	0	....	1	....	....	....
Cooperstown	2,368	2	....	0	....	0	....	....	....
Walton	4,869	5	....	0	....	2	....	....	....
Delhi	3,243	3	....	0	....	1	....	....	....
Liberty	4,568	8	....	0	....	0	125	....	....
Rest of district	225,844	266	14.0	46	17.2	99	108	....	2
WEST CENTRAL DISTRICT Totals	316,000	342	12.8	48	14.1	125	97	1	7
AUBURN	30,345	33	13.0	13	39.0	3	150	....	....
ITHACA	13,136	12	....	2	16.7	6	....	....	....
Hector	4,137	2	....	0	....	1	....	....	....
Waterloo	4,256	5	....	1	20.0	2	....	....	....
Seneca Falls	6,519	8	....	3	37.5	2	250	....	....
GENEVA	10,433	12	....	2	16.7	4	....	....	....
Canandaigua	6,151	9	....	3	33.3	0	111	....	....
Manchester	4,733	3	....	0	....	2	....	....	....
Phelps	4,788	9	....	2	22.2	5	111	....	....
Penn Yan	4,650	8	....	1	12.5	2	125	....	....
Batavia	9,180	8	....	0	....	0	250	....	2
Dansville	3,633	2	....	0	....	0	....	....	....
Le Roy	3,144	5	....	0	....	1	....	....	....
Warsaw	4,341	5	....	0	....	2	200	....	....
Rest of district	206,500	221	13.0	21	9.5	95	90	1	5
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	960	13.0	216	22.5	234	125	1	34
BUFFALO	352,387	393	13.1	101	25.7	68	145	....	17
Tonawanda	7,421	11	....	5	45.4	1	363	....	2
Amherst	4,223	4	....	1	25.0	1	....	....	....

R OCTOBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	.....	.....	...	1	....	2	.....	....	1	....	.....
...	...	...	...	...	2	1	1	1	...	4	....	2	6	....	2	....	2
...	...	...	...	...	...	...	1	.....	...	1	....	.....	1	....	....	....	.....
...	...	...	...	...	...	...	1	2	...	1	....	1	1	....	5	1	.....
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...	...	...	...	...	...	2	.....	1	...	1	....	1	.....	1	....	2	1
...	2	...	...	...	...	1	2	1	...	1	1	1	1	....	1	....	3
...	...	...	...	...	2	...	4	2	...	2	1	2	6	2	1	1	3
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...	...	...	...	...	1	2	.....	.....	...	2	....	1	2	....	....	....	.....
...	2	...	1	2	5	11	18	21	2	20	15	37	40	15	16	20	33
...	1	3	1	5	7	19	35	41	3	58	43	54	65	21	22	39	39
...	...	...	...	1	2	3	9	9	...	11	10	25	15	4	9	7	12
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...	...	...	...	...	...	...	.....	2	...	1	....	.....	2	....	....	1	1
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...	...	3	1	4	5	14	23	23	2	41	23	18	38	13	9	26	21
...	...	...	...	...	3	21	20	20	4	28	19	58	56	21	16	36	31
...	...	...	...	...	2	3	3	1	...	4	1	7	3	1	....	....	8
...	...	...	...	...	...	...	.....	1	...	....	1	2	1	1	2	2	2
...	...	...	...	...	...	...	.....	.....	...	.....	....	.....	.....	1	....	1	.....
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...	...	...	...	...	...	2	.....	1	...	1	....	2	.....	1	....	1	.....
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...	...	...	...	...	...	1	1	.....	1	1	....	1	2	....	....	....	2
...	...	...	...	...	...	...	1	.....	...	.....	1	.....	1	....	1	2	.....
...	...	...	...	...	...	1	1	.....	...	.....	....	1	3	....	....	1	.....
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...	...	...	...	...	...	...	.....	1	...	.....	....	.....	.....	1	....	....	.....
...	...	...	...	...	...	...	.....	1	...	.....	....	.....	.....	1	....	....	.....
...	...	...	...	...	...	...	.....	.....	...	.....	....	1	1	....	....	1	2
...	...	...	...	...	...	1	.....	.....	...	.....	....	3	1	....	....	....	.....
...	...	...	...	...	1	12	14	14	2	18	14	37	42	12	9	20	14
2	2	2	1	3	17	62	58	74	6	75	57	99	135	48	87	69	125
...	1	2	...	...	12	25	33	28	1	24	30	39	45	14	34	28	60
...	...	...	...	1	...	1	1	1	...	1	1	.....	2	....	1	...	.
...	...	...	...	...	...	...	...	...	1	.....	.....	.....	.....	....	1	1	1

MONTHLY BULLETIN

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NORTH TONAWANDA	9,069	15	.....	5	33.3	4	133	...	
LOCKPORT	16,584	13	.....	2	16.2	4	80	...	1
NIAGARA FALLS	19,457	31	18.6	8	25.8	2	225	...	2
Medina	4,716	7	.....	1	14.2	3	142	...	
Albion	4,477	7	.....	1	14.2	2	285	...	1
Brockport	3,400	3	.....	1	33.3	2	.....	...	...
ROCHESTER	162,608	188	13.6	36	20.0	42	98	...	4
Palmyra	3,758	4	.....	0	.....	2	250	...	...
Newark	4,578	1	.....	1	.....	0	.....	...	
Lyons	5,824	9	.....	0	.....	4	222	...	2
Clyde	2,507	.....	.....	.....	.....	.....	.....	...	...
OSWEGO	22,200	23	.....	4	.....	7	.....	1	...
FULTON	8,734	14	.....	1	7.1	7	.....	...	...
Richland	3,535	4	.....	1	25.0	2	250	...	...
Rest of district	244,184	233	12.0	48	20.6	83	100	...	5
Totals for the state	7,467,050	9,475	15.0	2,537	27.0	1,611	132	34	225
Average for past 5 years	....	9,480	16.0	2,720	28.5	1,646	135	35	235

R OCTOBER —(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	1	...	1	.....	1	...	2	1	1	1	....	3	1	3
...	...	...	...	...	...	...	.....	2	...	1	....	.....	3	....	3	1	2
...	1	...	...	1	1	2	1	.....	1	1	1	.....	5	....	10	....	5
...	...	...	...	...	...	1	.....	1	...	....	....	.....	2	1	1	1	.....
...	...	...	...	...	...	1	.....	2	...	....	....	.....	1	....	....	1	1
...	...	...	...	...	...	...	.....	.....	...	1	....	1	.....	....	....	....	1
2	...	...	...	...	2	10	12	15	...	24	10	23	23	19	8	14	22
...	...	...	...	...	1	...	.....	.....	...	....	....	1	1	....	....	1	.....
...	...	...	...	...	...	...	.....	.....	...	....	....	.....	1	....	....	....	.....
...	...	...	...	...	...	...	.....	1	...	....	....	.....	1	....	1	2	2
...	...	...	...	...	...	...	.....	.....	...	....	....	.....	.....	....	....	....	.....
...	...	...	1	...	1	1	1	1	...	....	2	5	4	....	2	2	2
...	...	...	...	...	...	...	.....	.....	...	....	1	4	4	....	1	1	3
...	...	...	...	...	...	1	.....	.....	...	....	....	1	2	....	....	....	.....
...	...	...	...	...	...	19	10	22	3	21	11	24	40	14	22	16	26
4	56	17	6	61	215	613	985	1,027	61	610	777	1,040	1,039	416	571	406	1,294
3	37	22	15	57	258	587	1,036	1,075	65	821	617	846	974	385	542	430	1,300

MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,948,906	5,185	17.0	1,469	28.3	542	110	13	106
CITY OF NEW YORK									
Totals	3,632,501	4,808	16.8	1,384	28.6	470	113	12	99
BOROUGH OF MANHATTAN	1,895,491	2,554	16.4	743	29.0	243	106	7	52
BOROUGH OF THE BRONX	244,111	360	18.0	93	26.0	28	100	1	3
BOROUGH OF BROOKLYN	1,249,650	1,576	15.8	445	27.0	186	122	2	42
BOROUGH OF QUEENS	172,472	222	15.8	74	33.3	19	150	2	2
BOROUGH OF RICHMOND	70,747	96	16.5	29	30.0	14	120	....	....
Oyster Bay	16,334	21	....	4	19.0	4	....	....	....
Hempstead	27,066	18	....	4	22.2	4	55	....	....
North Hempstead	12,048	6	....	1	....	3	....	....	....
Southold	8,301	4	....	1	25.0	0	....	....	....
Sag Harbor	3,500	2	....	0	....	0	....	....	....
Huntington	9,483	8	....	0	....	2	....	....	1
Brookhaven	14,592	20	....	2	10.0	4	150	....	3
YONKERS	47,931	75	18.5	20	26.6	14	26	1	....
Greenburg	15,564	17	....	4	23.5	2	....	....	....
MOUNT VERNON	20,346	25	15.0	8	32.0	7	80	....	....
Port Chester	7,440	12	....	6	....	1	....	....	....
Ossining	7,939	14	....	1	9.0	8	....	....	....
NEW ROCHELLE	14,720	14	....	5	35.6	1	70	....	1
Peekskill	10,358	17	....	7	41.0	2	....	....	....
White Plains	7,900	14	....	6	43.0	1	142	....	....
Rest of district	94,382	110	14.2	16	15.0	19	100	....	2
HUDSON VALLEY DISTRICT									
Totals	690,000	882	15.4	139	16.0	197	76	....	24
ALBANY	94,151	156	20.0	21	13.5	31	60	....	6
COHOES	24,000	21	....	10	48.0	3	128	....	....
TROY	75,057	125	20.0	26	20.8	17	72	....	2
WATERVLIET	14,321	22	....	4	19.2	6	50	....	....
Green Island	4,770	6	....	0	....	1	....	....	....
Hoosick Falls	5,671	3	....	0	....	1	....	....	....
RENSSELAER	10,000	17	....	3	17.5	0	60	....	1
Coxsackie	4,102	7	....	0	....	3	142	....	....
Catskill	5,486	14	....	1	7.0	5	140	....	1
HUDSON	9,528	19	....	1	5.0	5	50	....	....
KINGSTON	24,535	26	13.0	5	19.2	8	40	....	....
Ellenville	3,000	6	....	3	50.0	0	....	....	....
Marbletown	3,511	1	....	1	....	0	....	....	....
Rosendale	6,278	5	....	1	....	0	....	....	....
Esopus	4,907	7	....	1	14.2	1	....	....	....
Saugerties	3,700	8	....	1	12.5	1	125	....	1
POUGHKEEPSIE	24,029	36	18.7	5	13.5	6	55	....	....
Fishkill	13,016	24	....	4	16.6	4	82	....	1
Wappinger Falls	3,504	7	....	2	28.5	3	....	....	....
NEWBURGH	25,000	35	17.0	4	11.5	1	53	....	2
Port Jervis	9,385	5	....	0	....	3	....	....	1
MIDDLETOWN	14,522	20	....	1	5.0	4	50	....	....
Warwick	6,403	6	....	3	50.0	0	166	....	....
Goshen	4,564	7	....	0	....	1	....	....	....

YORK STATE DEPARTMENT OF HEALTH

districts, cities, villages and towns during November, 1902

villages in *italic* and towns in Roman type

Zymotic Diseases								Other Causes of Death										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
6	1	36	17	4	30	177	180	867	650	43	256	445	495	492	223	348	84	712
5	1	33	16	4	28	172	174	831	613	41	221	406	446	438	207	325	67	669
1	. .	13	9	3	17	80	89	437	292	22	132	212	252	241	121	192	38	344
...	...	6	1	..	4	9	12	68	102	4	11	17	21	24	15	16	5	41
4	1	10	4	1	6	73	51	298	180	12	60	150	136	137	59	86	22	233
...	...	1	. .	...	...	7	20	14	27	3	14	10	24	28	8	21	1	40
...	...	3	2	...	1	3	2	14	12	...	4	8	13	8	4	10	1	11
...	...	...	...	...	...	...	...	...	2	...	3	2	5	3	3	2	...	1
...	...	...	...	...	...	1	...	1	2	...	2	3	2	2	1	...	2	2
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...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	1	...	...	1
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...	...	...	...	...	...	...	1	15	8	1	3	8	12	10	3	4	1	8
...	...	...	...	...	...	...	...	...	3	...	2	4	1	1	...	2	...	4
...	...	2	...	...	...	...	...	2	3	...	1	4	4	3	...	2	1	3
...		...	...	...	1	1	1	1	...	...	1	1	...	...	1	4	...	1
...		...	...	...	...	...	...	1	...	...	1	2	3	1	2	1	2	1
...		...	...	...	...	...	...	2	...	...	2	...	1	3	1	...	1	3
...		...	...	...	...	...	...	...	2	...	2	1	1	4	...	...	1	6
...		...	1	...	...	...	1	4	2	...	1	1	1	1	...	...	...	2
1		1	...	...	1	3	3	10	11	1	15	2	14	23	3	5	7	8
...		1	1	1	5	20	15	119	73	1	54	67	126	120	54	64	49	88
...		...	...	...	1	2	...	37	17	...	9	23	20	7	12	8	5	9
...		...	...	...	...	2	1	3	2	...	1	2	2	3	1	2	...	2
...		...	1	...	...	1	5	13	15	...	8	6	20	25	4	7	6	12
...		...	...	...	1	...	...	5	1	...	...	2	5	1	1	1	2	3
...		...	...	...	...	...	...	1	1	...	1	...	...	...	1	1	...	1
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...		...	...	...	...	1	...	...	...	...	2	1	1	1	1	...	...	...
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...		...	...	...	...	1	...	5	1	...	...	1	3	2	1	3	2	...
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...		...	...	...	...	1	...	4	...	...	...	2	2	4	1	4	1	4
...		...	...	...	...	...	...	...	...	...	1	...	...	1	1	2	1	1
...		...	...	...	...	...	...	3	3	...	2	6	3	4	4	6	1	1
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...		...	...	...	...	1	...	3	2	...	3	1	5	1	...	3	1	...
...		...	...	...	...	...	1	1	...	...	...	1	...	...	...	1	...	2
...		...	...	...	...	...	...	...	...	...	1	...	2	2	...	1	...	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	9	.....	3	33.3	1	333	....	....
Haverstraw	9,874	6	.....	0	.....	2	....	....	....
Nyack	4,275	.....	.....	.....	.....	.....	....	....	....
Ramapo	7,502	6	.....	1	16.7	1	167	....	....
Rest of district	268,970	278	12.5	38	14.0	89	88	....	9
ADIRONDACK AND NORTHERN DISTRICT									
Totals	394,772	382	12.0	56	14.7	122	71	....	11
WATERTOWN	21,700	30	16.5	4	13.3	11	133	....	1
Ellisburg	3,888	3	.....	0	.....	2	....	....	....
Cape Vincent	2,882	5	.....	1	20.0	3	....	....	....
Clayton	4,313	2	.....	0	.....	1	....	....	....
OGDENSBURG	12,633	9	.....	1	11.1	3	....	....	....
Gouverneur	6,000	7	.....	1	14.2	1	....	....	....
Potsdam	3,843	2	.....	1	.....	0	....	....	....
Canton	6,387	11	.....	0	.....	5	....	....	....
Malone	5,935	3	.....	0	.....	1	....	....	....
Plattsburg	8,434	9	.....	1	11.1	2	111	....	1
Glens Falls	12,613	16	.....	4	25.0	4	....	....	....
Whitehall	4,377	5	.....	2	40.0	1	....	....	....
Fort Edward	5,216	2	.....	0	.....	0	....	....	....
Sandy Hill	4,473	4	.....	1	25.0	1	....	....	....
Granville	5,217	2	.....	0	.....	0	....	....	....
Greenwich	4,172	3	.....	0	.....	2	....	....	....
Lowville	3,746	5	.....	0	.....	3	200	....	1
Rest of district	278,984	264	11.5	40	15.4	82	80	....	8
MOHAWK VALLEY DISTRICT									
Totals	419,973	481	14.4	99	20.7	123	100	1	10
SCHENECTADY	47,625	66	17.0	21	31.5	6	100	....	1
Cobleskill	3,973	6	.....	1	.....	2	....	....	....
AMSTERDAM	20,929	48	27.5	17	35.5	8	400	....	1
Fort Plain	2,444	3	.....	0	.....	2	....	....	....
JOHNSTOWN	10,130	11	.....	2	18.2	4	....	....	....
GLOVERSVILLE	18,349	14	.....	3	21.4	4	215	1	1
LITTLE FALLS	10,381	6	.....	0	.....	1	....	....	....
Herkimer	5,555	1	.....	0	.....	0	....	....	....
Ilion	5,138	3	.....	0	.....	1	....	....	....
UTICA	56,383	80	17.0	25	31.2	11	62	....	1
Whitestown	6,235	11	.....	4	36.4	4	90	....	1
ROME	15,343	18	.....	2	11.1	4	....	....	....
Boonville	3,332	1	.....	0	.....	0	....	....	....
Camden	3,745	1	.....	0	.....	0	....	....	....
Waterford	6,157	6	.....	1	16.7	1	....	....	....
Mechanicville	4,695	10	.....	1	10.0	1	100	....	1
Ballston Spa	3,923	11	.....	2	18.2	4	90	....	....
Saratoga Springs	12,409	16	.....	3	18.5	7	60	....	....
Rest of district	183,228	169	11.0	17	10.0	63	53	....	4
SOUTHERN TIER DISTRICT									
Totals	429,530	420	12.0	52	12.4	132	71	....	6
BINGHAMTON	39,647	51	16.0	6	12.5	16	20	....	....
Owego	5,039	10	.....	2	20.0	5	300	....	1
Candor	3,300	4	.....	0	.....	2	....	....	....
Waverly	4,465	3	.....	0	.....	1	....	....	....
ELMIRA	35,672	35	12.0	4	11.5	6	26	....	....

FOR NOVEMBER—(*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
				1		2		3			1							2
									3					1			1	1
							1	1							1	2		1
		1			2	6	6	20	14	1	14	20	48	49	19	18	24	27
1		1		2	1	6	5	37	34	4	31	27	33	59	20	27	46	37
						2	1	3	2		1	5	6	3		1	2	3
											1		1			1		
								1			1		1				2	
								1									1	
								2	2	1		1		1		2		
											1	1		3		1		1
								1										1
									1		1	1	2	3			3	
									1				1			1		
								1	1				1	1	1		2	1
								1			3	1		2	1	2	3	3
								1								2		2
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									1						1			
								1						1		1		
											1			1			2	
1		1		2	1	4	4	25	24	3	22	18	21	43	17	16	30	24
		18			1	9	8	61	41	1	41	25	49	70	19	39	31	54
						4	2	10	7		8	5	4	8	1	6	1	9
								1	1			1		1		1		1
		16				2		4	4		6	1	2	4	1	2	1	4
														1			1	1
									1		1	1	2	3	1	1		1
							1	1			2	1	1	3		1	1	1
								2						1	1		1	1
																1		
														1	2			
						2	2	12	8	1	4	5	6	11	2	8	5	13
								3				1	1	3			1	1
								2	1		2	1	4	1	1	2		4
									1									
														1				
								2	1					1				2
								4	1		2							2
							1	2				1	1	3	1	1	1	
					1			3				1	4	2		3		2
		2				1	2	15	16		16	7	24	26	9	13	22	12
		2				14	8	48	27	2	45	26	71	56	18	24	36	37
						1		6	7	1	5	3	7	4	2	1	9	5
						2		1			1		3				1	1
											1		1	1		1		
													1	1		1		
							1	7	7		6	1	2	6		2	1	2

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
SOUTHERN TIER DIS.—(*Con.*)									
Horseheads	4,944	7	....	0	....	3	....	....	....
HORNELLSVILLE	12,000	6	....	0	....	1	....	....	....
Bath	5,000	2	....	0	....	0	....	....	....
CORNING	11,061	17	....	2	11.8	5	....	....	....
Wellsville	5,000	5	....	1	20.0	2	....	....	....
OLEAN	9,462	11	....	4	36.4	0	....	....	....
Salamanca	4,251	4	....	0	....	1	....	....	....
DUNKIRK	11,616	15	....	5	33.3	2	65	....	1
JAMESTOWN	22,892	19	10.0	4	21.0	6	100	....	....
Westfield	2,430	4	....	0	....	1	....	....	....
Fredonia	4,125	8	....	1	12.5	3	125	....	....
Rest of district	248,594	219	10.3	23	10.5	78	95	....	4
EAST CENTRAL DISTRICT Totals	402,660	395	12.6	52	13.5	130	40	....	7
SYRACUSE	108,374	117	13.0	20	17.1	32	17	....	1
Baldwinsville	3,000	1	....	1	....	0	....	....	....
DeWitt	5,435	9	....	1	11.1	1	....	....	1
CORTLAND	9,014	3	....	1	33.3	0	333	....	....
Homer	2,381	3	....	0	....	1	....	....	....
ONEIDA	7,942	8	....	1	12.5	3	250	....	2
Hamilton	3,744	1	....	0	....	1	....	....	....
Cazenovia	3,830	4	....	0	....	1	....	....	1
Brookfield	2,726	3	....	0	....	1	....	....	....
Norwich	5,766	13	....	2	15.5	4	....	....	....
Oneonta	7,147	5	....	0	....	2	....	....	....
Worcester	2,409	3	....	0	....	1	....	....	....
Cooperstown	2,368	4	....	1	25.0	2	....	....	....
Walton	4,869	1	....	0	....	0	....	....	....
Delhi	3,243	4	....	0	....	1	....	....	....
Liberty	4,568	10	....	1	10.0	2	....	....	....
Rest of district	225,844	206	12.0	24	12.0	78	50	....	2
WEST CENTRAL DISTRICT Totals	316,000	324	12.5	27	8.3	126	85	1	8
AUBURN	30,345	41	16.5	3	7.3	7	50	1	....
ITHACA	13,136	12	....	0	....	6	83	....	1
Hector	4,137	4	....	1	25.0	1	250	....	....
Waterloo	4,256	7	....	1	14.2	4	142	....	1
Seneca Falls	6,519	8	....	0	....	2	....	....	....
GENEVA	10,433	10	....	1	10.0	2	....	....	....
Canandaigua	6,151	....	....	....	....	....	....	....	....
Manchester	4,733	6	....	0	....	4	....	....	....
Phelps	4,788	2	....	0	....	1	....	....	....
Penn Yan	4,650	9	....	1	11.1	5	111	....	1
Batavia	9,180	6	....	0	....	1	....	....	....
Dansville	3,633	7	....	1	14.2	2	142	....	....
Le Roy	3,144	3	....	0	....	1	....	....	....
Warsaw	4,341	8	....	1	12.5	3	125	....	1
Rest of district	206,500	201	11.0	18	9.0	87	100	....	4
LAKE ONTARIO AND WESTERN DISTRICT Totals	876,206	941	13.0	192	20.5	223	113	....	36
BUFFALO	352,387	396	13.6	89	22.5	70	140	....	25
Tonawanda	7,421	11	....	2	18.2	4	90	....	1
Amherst	4,223	4	....	0	....	1	....	....	....

FOR NOVEMBER — (*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	...	...	...	...	...	...	...	2	2	2	...	1	...	...
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...	...	...	...	...	...	1	...	...	1	...	...	...	3	2	1	...	...	...
...	...	2	...	...	...	8	7	25	5	1	22	20	40	28	13	13	18	13
...	...	...	1	2	1	2	3	38	37	5	25	26	76	53	21	24	33	41
...	...	...	...	...	...	1	...	11	10	1	10	10	30	14	2	3	9	15
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	1	2	...	...	...	1	3	...	1	1	...
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...	...	...	1	2	1	1	3	19	14	4	11	11	42	31	15	14	16	19
1	...	1	...	...	1	5	11	36	16	2	27	18	56	43	25	19	26	28
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1	...	1	...	...	1	3	10	20	11	1	15	11	39	28	14	7	19	16
2	19	4	...	1	5	15	24	121	73	3	62	55	91	150	39	80	66	95
...	...	...	...	1	4	10	16	64	39	2	21	14	27	63	17	35	29	29
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MONTHLY BULLETIN OF THE NEW

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MARITIME DISTRICT									
Totals	3,918,906	5,805	18.8	1,629	28.1	717	103	11	83
CITY OF NEW YORK									
Totals	3,632,501	5,403	17.5	1,544	28.5	618	105	10	78
BOROUGH OF MANHATTAN	1,895,491	2,916	18.0	861	29.5	293	102	9	35
BOROUGH OF THE BRONX	244,141	329	16.0	68	20.5	36	136	....	8
BOROUGH OF BROOKLYN	1,249,650	1,820	17.5	521	28.5	241	110	1	29
BOROUGH OF QUEENS	172,472	236	16.0	65	27.5	32	95	....	4
BOROUGH OF RICHMOND	70,747	102	17.0	29	29.0	16	90	....	2
Oyster Bay	16,334	4	.....	0	.....	2	....	....	....
Hempstead	27,066	31	13.5	1	3.2	13	32	....	1
North Hempstead	12,048	19	.....	3	16.0	5	105	....	1
Southold	8,301	9	.....	1	11.1	3	111	....	....
Sag Harbor	3,500	2	.....	0	.....	1	....	....	....
Huntington	9,483	16	.....	2	12.5	9	....	....	....
Brookhaven	14,592	10	.....	1	.....	6	....	....	....
YONKERS	47,931	64	15.5	22	34.4	10	62	....	....
Greenburg	15,564	21	.....	5	24.5	6	150	....	....
MOUNT VERNON	20,346	18	.....	8	.....	3	....	....	....
Port Chester	7,440	10	.....	0	.....	4	111	....	....
Ossining	7,939	9	.....	4	44.4	1	111	....	....
NEW ROCHELLE	14,720	32	.....	12	37.5	4	160	....	2
Peekskill	10,358	20	.....	5	25.0	4	100	....	1
White Plains	7,900	15	.....	2	13.3	4	133	1	....
Rest of district	94,382	122	15.2	19	15.5	24	57	....	....
HUDSON VALLEY DISTRICT									
Totals	690,000	981	16.6	192	19.4	225	85	....	27
ALBANY	94,151	139	17.3	31	22.2	27	50	....	....
COHOES	24,000	59	27.7	21	31.0	3	250	....	5
TROY	75,057	119	18.8	26	22.0	25	67	....	4
WATERVLIET	14,321	21	.....	9	43.0	4	200	....	....
Green Island	4,770	10	.....	2	20.0	2	....	....	....
Hoosick Falls	5,671	13	.....	1	7.7	4	....	....	....
RENSSELAER	10,000	20	.....	5	25.0	2	300	....	3
Coxsackie	4,102	5	.....	1	20.0	0	....	....	....
Catskill	5,486	6	.....	0	.....	3	....	....	....
HUDSON	9,528	16	.....	2	12.5	2	....	....	....
KINGSTON	24,535	35	17.0	6	17.0	4	85	....	....
Ellenville	3,000	2	.....	0	.....	1	....	....	....
Marbletown	3,511	3	.....	0	.....	0	....	....	....
Rosendale	6,278	13	.....	3	23.0	0	77	....	....
Esopus	4,907	4	.....	0	.....	2	....	....	....
Saugerties	3,700	5	.....	0	.....	1	....	....	....
POUGHKEEPSIE	24,029	27	13.5	4	14.8	11	....	....	....
Fishkill	13,016	21	.....	6	20.0	3	65	....	....
Wappinger Falls	3,504	5	.....	0	.....	2	....	....	....
NEWBURGH	25,000	42	20.0	6	14.3	8	96	....	1
Port Jervis	9,385	24	.....	7	29.2	4	84	....	....
MIDDLETOWN	14,522	23	17.5	4	17.3	4	217	....	3
Warwick	6,403	4	.....	1	25.0	1	....	....	....
Goshen	4,564	6	.....	1	16.6	1	166	....	....

RK STATE DEPARTMENT OF HEALTH

tricts, cities, villages and towns during December, 1902.

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ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system.	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	44	33	19	22	231	156	1,025	651	52	272	571	543	532	232	311	132	882
...	44	32	19	18	217	149	969	614	51	241	537	493	469	210	289	112	848
...	16	16	14	9	102	95	510	300	30	147	293	255	260	132	170	39	484
...	12	3	...	1	14	5	43	85	2	13	19	24	26	10	16	10	37
...	14	12	4	5	89	42	371	197	17	67	192	173	143	56	83	53	270
...	...	...	...	1	11	7	27	19	1	12	23	33	24	10	14	5	45
...	2	1	1	2	1	...	18	13	1	2	10	8	16	2	6	5	12
...	...	...	...	...	...	...	.....	1	...	....	1	.....	1	1	....	....	.....
...	...	...	...	...	...	...	6	3	...	1	3	3	5	3	2	3	1
...	...	...	...	...	1	...	1	2	...	1	3	1	4	1	2	2	.....
...	...	...	...	...	...	1	1	1	1	....	1	1	3	....	....	....	.....
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...	...	...	...	...	...	...	6	.....	...	....	3	3	1	....	2	1	.....
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...	...	...	...	...	2	2	14	7	...	8	7	5	6	....	5	1	7
...	...	...	...	1	...	2	1	1	...	3	4	1	.....	2	2	2	2
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...	...	...	...	1	5	1	10	17	...	9	6	19	26	10	4	2	12
..	3	2	2	15	16	17	155	91	5	71	73	138	133	51	48	43	90
...	...	...	...	2	4	...	27	15	1	8	17	25	11	9	9	6	5
...	...	...	...	3	1	5	8	5	...	6	3	4	4	3	2	...	10
...	...	...	...	1	1	2	26	11	...	9	5	15	18	4	1	6	16
...	...	...	...	...	1	3	3	2	...	....	....	3	4	1	1	1	2
...	...	...	...	...	...	...	1	.....	...	2	....	1	.....	2	1	....	3
...	...	...	...	...	...	...	4	1	...	2	1	2	2	....	....	1	.....
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...	...	...	...	...	1	...	1	.....	...	....	....	.....	1	1	1	1	.....

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
HUDSON VALLEY DIS.—(*Con.*)									
Montgomery	5,939	5	.....	1	20.0	1	....	....	....
Haverstraw	9,874	4	.....	1	25.0	0	....	....	....
Nyack	4,275	3	.....	0	.....	1	....	....	....
Ramapo	7,502	3	.....	1	.....	0	....	....	....
Rest of district	268,970	344	15.3	53	14.2	109	75	....	11
ADIRONDACK AND NORTHERN DISTRICT									
Totals	394,772	430	13.0	67	15.3	141	60	2	10
Watertown	21,700	27	15.0	6	22.2	4	111	....	3
Ellisburg	3,888	5	.....	0	.....	2	....	....	....
Cape Vincent	2,882	5	.....	0	.....	5	....	....	....
Clayton	4,313	5	.....	1	20.0	2	....	....	....
Ogdensburg	12,633	14	13.0	0	.....	3	....	....	....
Gouverneur	6,000	12	.....	3	25.0	2	....	....	....
Potsdam	3,843	7	.....	1	14.2	1	142	....	....
Canton	6,387	6	.....	1	16.7	1	....	....	....
Malone	5,935	6	.....	3	50.0	1	333	....	1
Plattsburg	8,434	4	.....	2	50.0	1	....	....	....
Glens Falls	12,613	18	17.0	1	5.0	6	50	1	....
Whitehall	4,377	6	.....	2	33.3	2	....	....	....
Fort Edward	5,216	8	.....	4	50.0	3	125	....	1
Sandy Hill	4,473	6	.....	1	16.7	[illegible]	....	....	....
Granville	5,217	4	.....	1	.....	1	....	....	....
Greenwich	4,172	7	.....	0	.....	2	200	....	1
Lowville	3,746	8	.....	1	12.5	5	....	....	....
Rest of district	278,984	282	12.0	40	14.0	96	55	1	3
MOHAWK VALLEY DISTRICT									
Totals	419,973	507	15.0	92	19.0	132	115	2	4
Schenectady	47,625	50	12.5	18	36.0	3	140	....	1
Cobleskill	3,973	2	.....	0	.....	0	500	....	1
Amsterdam	20,929	49	27.4	16	33.0	4	400	....	1
Fort Plain	2,444	3	.....	0	.....	0	....	....	....
Johnstown	10,130	15	18.0	0	.....	5	....	....	....
Gloversville	18,349	19	13.0	1	5.2	3	52	....	....
Little Falls	10,381	5	.....	1	20.0	0	400	....	....
Herkimer	5,555	5	.....	0	.....	3	....	....	....
Ilion	5,138	3	.....	0	.....	1	....	....	....
Utica	56,383	96	20.0	17	17.5	23	45	1	....
Whitestown	6,235	7	.....	1	14.3	1	143	....	....
Rome	15,343	22	17.5	2	9.0	8	90	....	....
Boonville	3,332	6	.....	0	.....	6	....	....	....
Camden	3,745	5	.....	0	.....	1	200	....	....
Waterford	6,157	11	.....	2	18.2	4	182	....	1
Mechanicville	4,695	5	.....	3	60.0	1	200	....	....
Ballston Spa	3,923	6	.....	1	16.6	4	166	....	....
Saratoga Springs	12,409	15	14.5	1	6.6	3	....	....	....
Rest of district	183,228	183	12.0	29	15.5	62	75	1	....
SOUTHERN TIER DISTRICT									
Totals	429,530	503	14.0	71	14.0	158	30	....	7
Binghamton	39,647	57	17.1	5	9.0	14	....	....	....
Owego	5,039	8	.....	0	.....	2	....	....	....
Candor	3,330	2	.....	0	.....	0	....	....	....
Waverly	4,465	2	.....	1	50.0	0	....	....	....
Elmira	35,672	43	14.2	12	28.0	4	25	....	....

DECEMBER — (*Continued*)

Zymotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
							1	1	1			1					1
							1					3					
											1		1			1	
								1				1					1
	2	1	1	1	3	5	50	29	1	27	23	55	64	12	15	20	27
2	2	2	1	3	2	2	42	48	4	26	32	50	69	15	18	51	49
							2			2	2	5	1	1	2	21	7
							1						2	1		1	
												2	1			2	
							2	1								1	1
							1	3			1	4	1	1			3
							3	1		1	1	1	2	1		1	1
						1	1			1		2	2				
										1	1	1					3
						1		1					2			1	
								1					1		1		1
							2	3			3	3	3		2	1	
										1		1			1	1	2
							1	1				1	2			1	1
							1	1			2		1			1	
								1			1		1				1
							2	1	1					1			
							1	1					5			1	
2	2	2	1	3	2		25	33	3	20	21	30	45	10	12	38	29
	23	1	2	3	17	4	72	38	2	40	37	70	77	20	27	27	41
		1			3	2	11	2		5	4	3	5		5	1	7
																	1
	19						7	4		4	1	1	5	2		1	4
							1						1	1			
							1			2	2	1	4	1	1	1	1
					1		1	1		3	3	2	3	1	1		3
			1		1			1		1	1						
							1					2				1	1
								1				1	1				
				1	2		14	9		8	9	16	14	6	5	3	8
					1		1		1			3					1
			1		1		4	1			1	3	6	3		2	
												2	1	1		2	
					1			1		1	1	1					
					1			2	1			1	2	1		1	1
					1		1						2				1
				1			1				1	1	1			1	
								5		1	2	3			1	1	2
	4			1	5	2	29	11		15	11	30	32	4	14	13	11
	3		2	1	16	3	52	35	4	51	37	64	77	[illegible]	[illegible]	48	43
							5	5		8	6	7	11	4	3	4	4
							1	2				6	1			1	1
										1					1		1
							1										1
					1		6	5	1	8	8	[illegible]	7	4	[illegible]	[illegible]	7

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
MOHAWK VALLEY DIS.—(*Con.*)									
Horseheads	4,944	7	.....	1	14.2	1	....	....	....
HORNELLSVILLE	12,000	13	.....	0	.....	3	....	....	....
Bath	5,000	1	.....	0	.....	0	....	....	....
CORNING	11,061	11	12.0	2	18.2	3	363	....	2
Wellsville	5,000	3	.....	0	.....	2	....	....	....
OLEAN	9,462	11	.....	1	9.0	3	180	....	....
Salamanca	4,251	1	.....	0	.....	0	....	....	....
DUNKIRK	11,616	20	.....	6	30.0	1	250	....	....
JAMESTOWN	22,892	22	12.0	3	13.7	6	273	....	....
Westfield	2,430	2	.....	0	.....	2	....	....	....
Fredonia	4,125	10	.....	3	30.0	2	400	....	1
Rest of district	248,594	290	14	37	12.7	115	50	....	4
EAST CENTRAL DISTRICT									
Totals	402,660	490	15.0	76	15.5	168	65	2	15
SYRACUSE	108,374	132	14.5	30	22.7	25	53	....	1
Baldwinsville	3,000	3	.....	0	.....	0	333	....	1
De Witt	5,435	6	.....	1	16.6	1	166	....	1
CORTLAND	9,014	13	.....	0	.....	7	....	....	....
Homer	2,381	7	.....	1	14.2	2	....	....	....
ONEIDA	7,942	13	.....	2	15.3	7	75	....	....
Hamilton	3,744	2	.....	0	.....	0	....	....	....
Cazenovia	3,830	.....	.....	.....	.....	.....	....	....	....
Brookfield	2,726	5	.....	0	.....	2	200	....	1
Norwich	5,766	14	.....	2	14.2	4	....	....	....
Oneonta	7,147	6	.....	2	33.3	2	167	....	1
Worcester	2,409	.....	.....	.....	.....	.....	....	....	....
Cooperstown	2,368	2	.....	0	.....	1	500	....	....
Walton	4,869	3	.....	0	.....	1	....	....	....
Delhi	3,243	2	.....	0	.....	1	....	....	....
Liberty	4,568	9	.....	1	11.1	1	....	....	....
Rest of district	225,844	273	14.0	37	13.5	114	65	2	10
WEST CENTRAL DISTRICT									
Totals	316,000	409	15.1	55	13.4	137	50	2	7
AUBURN	30,345	47	18.3	11	23.4	5	42	....	1
ITHACA	13,136	19	17.5	2	10.5	2	52	....	....
Hector	4,137	3	.....	1	33.3	1	....	....	....
Waterloo	4,256	7	.....	2	28.5	2	....	....	....
Seneca Falls	6,519	11	.....	3	27.3	2	190	....	1
GENEVA	10,433	11	.....	2	18.2	4	....	....	....
Canandaigua	6,151	11	.....	2	16.6	3	85	....	....
Manchester	4,733	4	.....	0	.....	0	....	....	....
Phelps	4,788	2	.....	1	50.0	0	....	....	....
Penn Yan	4,650	6	.....	1	16.6	2	....	....	....
Batavia	9,180	8	.....	2	25.0	1	....	....	....
Dansville	3,633	4	.....	0	.....	1	....	....	....
Le Roy	3,144	5	.....	0	.....	4	....	....	....
Warsaw	4,341	4	.....	0	.....	1	....	....	....
Rest of district	206,500	267	15.2	28	10.5	109	56	2	5
LAKE ONTARIO AND WESTERN DISTRICT									
Totals	876,206	1,222	16.5	265	21.6	280	117	1	29
BUFFALO	352,387	503	16.5	132	26.0	73	175	....	14
Tonawanda	7,421	8	.....	4	50.0	1	....	....	....
Amherst	4,223	6	.....	2	33.3	3	....	....	....

FOR DECEMBER —(*Continued*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	**Unclassified**
											1	1	1	3				1
									2		2	1	2	2	1	2	1	
								1										
						2		1			1		2			1	1	1
													1	1			1	
		2						1	1		1	1	1			2	2	
											1							
		1				4		4	1		3	1			1	3		2
				1		1		1	3		4	2	2	4	1		1	2
												1	1					
						3		1			1	1		1	1	1		
				1	1	5	3	30	16	3	25	20	43	47	16	17	35	24
			1	1	2	7	3	60	33	3	43	36	76	67	23	23	44	51
			1		1	4		14	10	1	19	9	13	16	6	7	6	2 4
									1							1		
												1	1	1			1	1
								1			3	2	1	2		3	1	
								1			1		1	2			2	
					1			3				2	3				4	
									1					1				
									1			1	1			1		
								4	1		2		2	2	2		1	
								2						1	1	1		
							1							1				
								2								1		
												1					1	
								1	3					1	1		1	2
				1		3	2	32	16	2	18	20	54	40	13	9	27	24
				1	2	6	3	51	30	1	32	25	54	66	25	26	41	37
						1		12	3		5	4	6	4	4	2	3	2
						1		1	4			3	3	3	2	1		1
											1		1					1
								1	1			1	1	2				1
						1		1	1		1		2	2		2		
											3		1	2		1	2	2
						1		2				2	1	3				2
											1				1	2		
											1							1
								1			1			1	2		1	
								2			1		1	3			1	
												1	1	1				1
								2			1			1			1	
									2						1		1	
				1	2	2	3	29	19	1	17	14	37	44	15	18	32	26
1	42	10		5	9	24	22	167	97	11	78	70	142	144	64	72	79	155
		1		4	6	14	15	95	46	7	24	24	47	58	26	35	22	65
								2			2					1		3
								1			1	1	1				1	1

SANITARY DISTRICTS	Estimated population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever
LAKE ONTARIO AND WESTERN DISTRICT—(*Con.*)									
NORTH TONAWANDA	9,069	9	.....	6	66.6	0	111	....	....
LOCKPORT	16,581	28	20.0	8	28.5	3	142	....	1
NIAGARA FALLS	19,457	37	22.2	11	30.0	9	190	....	2
Medina	4,716	3	.....	1	33.3	0	333	....	....
Albion	4,477	3	.....	1	33.3	2	....	....	....
Brockport	3,400	5	.....	2	40.0	0	200	....	....
ROCHESTER	162,608	258	18.6	39	11.5	58	180	1	2
Palmyra	3,758	8	.....	0	.....	4	....	....	....
Newark	4,578	4	.....	0	.....	2	250	....	1
Lyons	5,824	5	.....	0	.....	2	....	....	....
Clyde	2,507	2	.....	0	.....	1	....	....	....
OSWEGO	22,200	31	16.5	4	15.0	11	65	....	....
FULTON	8,734	14	.....	3	21.4	5	142	....	1
Richland	3,535	4	.....	1	.....	0	....	....	....
Rest of district	244,184	294	14.2	50	16.7	106	82	....	[illegible]
Totals for the state	7,467,050	10,347	16.5	2,447	23.6	1,958	97	20	18
Average for past five years	....	10,026	17.1	2,360	23.5	1,855	94	35	180

FOR DECEMBER — (*Concluded*)

ZYMOTIC DISEASES								OTHER CAUSES OF DEATH										
Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	1	1	...	4
...	...	2	...	...	...	1	...	1	4	...	3	2	5	2	...	1	2	4
...	...	5	...	...	...	...	...	4	3	...	5	2	6	1	...	2	4	3
...	...	...	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...
...	...	...	...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...
...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	2
...	39	...	...	1	2	...	1	27	18	...	15	13	32	40	20	9	18	20
...	...	...	...	...	...	...	...	...	1	...	1	...	2	2	2	...	...	...
...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...	...
...	...	...	...	...	...	...	...	...	1	...	1	...	...	1	1	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...
...	...	...	...	...	...	2	...	2	2	...	1	5	4	3	4	3	2	3
...	...	...	...	...	...	...	1	2	2	...	...	1	1	3	1	...	1	1
...	...	...	...	...	...	...	...	...	...	...	2	...	...	1	...	...	...	1
1	3	2	...	...	...	6	4	30	18	4	21	20	42	32	8	19	29	47
5	44	85	39	33	57	319	210	1624	1,023	82	613	881	1,137	1,165	458	557	465	1,348
20	5	71	80	26	56	322	146	1819	1,092	77	642	788	1,011	1,096	397	463	482	1,217

RELATIVE AREA, DENSITY OF POPULATION AND DEATH RATES IN THE SANITARY DISTRICTS FOR THE YEAR 1902

DISTRICTS	Area in square miles	Population per square mile.	Urban death rate*	Rural death rate†	Total death rate	PERCENTAGE OF DEATHS— Under 5 years of age	At 70 years of age and over	From zymotic diseases	IN EACH 1,000 DEATHS FROM ALL CAUSES THERE WERE FROM— Typhoid fever	Scarlet fever	Diphtheria and croup	Diarrheal diseases	Consumption	Acute respiratory diseases
Maritime	2,286	1,728	18.7	18.5	18.6	34.8	10.0	17.0	11	13	28	85	110	160
Hudson valley	5,872	117	18.0	15.0	16.0	19.5	22.5	10.0	23	5	16	42	107	117
Adirondack and Northern	15,080	26	15.0	12.0	13.0	16.7	29.0	9.0	20	6	9	33	105	92
Mohawk valley	4,731	86	19.0	13.5	15.0	21.0	26.5	10.0	14	13	20	44	85	105
Southern tier	6,545	66	15.0	13.0	14.0	17.0	31.0	9.5	17	5	21	34	75	100
East central	6,555	62	14.0	14.0	14.0	16.5	30.0	7.0	13	2	8	33	90	95
West central	4,746	96	15.5	13.0	14.0	13.3	35.5	7.0	11	1	8	35	77	95
Lake Ontario and Western	4,378	200	14.6	13.5	14.0	23.8	22.5	12.5	20	4	17	56	85	105
Entire state	50,200	150	17.5	15.5	17.0	25.3	17.0	14.0	14	11	23	67	102	138

*(Namely in cities of 20,000 population and over.) †(In towns and places of less than 20,000 population.)

SUMMARY OF MORTALITY OF THE STATE OF NEW YORK FOR THE YEAR 1902, AS PUBLISHED IN THE MONTHLY BULLETIN

TOTALS OF MORTALITY OF THE STATE BY MONTHS

1902	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
January	10,968	17.3	2,933	26.8	2,015	103	48	146	16	30	141	132	42	58
February	10,670	18.0	2,890	27.0	1,903	102	47	63	14	51	162	166	34	72
March	10,935	17.5	2,936	27.0	1,895	98	44	112	16	51	134	138	33	69
April	10,772	17.5	2,444	22.5	1,914	100	42	103	12	61	142	122	44	85
May	10,616	17.0	2,778	26.5	1,837	105	46	99	20	52	175	104	32	83
June	9,419	15.5	2,790	29.5	1,438	150	36	99	16	70	111	100	28	86
July	10,938	17.5	4,132	38.5	1,565	250	54	107	21	34	76	57	23	115
August	10,632	17.0	4,024	38.0	1,474	250	40	165	21	10	39	28	14	110
September	9,682	15.8	3,218	32.6	1,504	195	30	179	20	6	31	7	15	83
October	9,475	15.0	2,537	27.0	1,611	132	34	225	18	4	56	17	6	61
November	9,010	14.7	2,086	23.2	1,595	100	15	208	10	20	63	19	10	44
December	10,347	16.5	2,447	23.6	1,958	97	20	182	5	44	85	39	33	57
Total for the year	123,494	17.0	31,215	25.3	20,709	140	456	1,318	189	442	1,215	929	311	923
Average for five years past	123,525	18.0	26,035	29.2	20,050	130	589	1,691	325	100	906	933	346	923
Totals for 1901	129,257	17.8	35,775	28.0	22,233	145	492	1,741	283	445	1,130	859	363	721

TOTALS OF MORTALITY OF THE STATE BY MONTHS—(*Concluded*)

1902	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
January	320	188	2,274	1,038	99	645	853	1,234	1,103	384	500	448	1,260
February	264	180	2,241	1,100	97	558	823	1,189	1,161	375	457	412	4,174
March	247	27	1,951	1,235	120	606	911	1,167	1,176	406	487	442	1,363
April	268	231	1,716	1,154	108	644	872	1,188	1,241	439	515	414	1,371
May	243	259	1,673	1,135	86	586	885	1,179	1,098	501	633	388	1,339
June	228	636	944	980	74	570	758	1,041	949	411	646	338	1,328
July	180	2,038	752	1,038	86	632	741	952	1,000	434	745	385	1,467
August	161	2,089	664	984	80	608	728	865	994	443	733	365	1,491
September	166	1,390	835	917	80	622	686	899	995	314	589	512	1,306
October	215	613	985	1,027	61	610	777	1,040	1,039	416	571	406	1,294
November	248	254	1,327	951	61	541	689	997	1,043	519	625	374	1,092
December	319	210	1,624	1,023	82	613	881	1,137	1,165	458	557	465	1,348
Total for the year	2,859	8,315	16,986	12,582	1,034	7,235	9,604	12,889	12,964	4,990	7,058	4,919	15,833
Average for five years past	3,171	7,010	17,482	13,270	1,002	9,471	8,924	10,931	12,997	4,590	6,684	5,594	15,686
Totals for 1901	3,026	9,337	17,589	13,766	1,068	7,478	9,558	11,949	13,366	5,033	7,926	5,439	17,388

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR 1902

DISTRICTS	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
Maritime	73,325	18.6	25,494	34.8	7,310	170	264	809	138	322	968	737	193	661
Hudson valley	11,070	16.0	2,150	19.5	2,533	100	35	251	25	14	50	20	14	88
Adirondack and Northern	4,981	13.0	937	16.7	1,454	90	30	99	5	9	28	25	14	24
Mohawk valley	6,086	15.0	1,252	21.0	1,609	100	26	84	1	2	77	16	11	10
Southern tier	5,811	14.0	987	17.0	1,807	95	19	101	6	6	30	29	23	20
East central	5,481	14.0	852	16.5	1,765	70	20	72	1	......	9	10	13	30
West central	4,448	14.0	593	13.3	1,577	70	12	50	8	6	5	3	15	23
Lake Ontario and Western	12,292	14.0	2,930	23.8	2,753	125	50	252	5	83	48	89	31	67

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR 1902 — (*Continued*)

DISTRICTS	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
Maritime	2,111	6,187	11,798	8,080	662	3,242	6,141	6,438	5,970	2,557	4,074	1,307	10,666
Hudson valley	175	467	1,279	1,180	61	837	811	1,458	1,493	497	629	594	1,092
Adirondack and Northern	46	167	459	521	42	399	311	591	681	229	262	469	570
Mohawk valley	121	261	631	517	38	506	426	706	859	282	401	440	668
Southern tier	121	198	574	431	49	510	407	787	830	259	350	512	519
East central	44	182	514	482	51	478	415	786	783	306	284	441	560
West central	33	156	430	341	30	351	288	710	678	216	251	399	413
Lake Ontario and Western	208	694	1,301	1,030	101	913	805	1,412	1,670	621	807	787	1,315

THE PRINCIPAL CAUSES OF DEATH FOR THE YEAR.— Including 666 delayed returns of death there has been reported 121,160 deaths during the year, making a death rate of 17.0 per thousand population. The number of deaths was that of the average of five preceding years, but was about 5,000 less than the mortality of 1901. The decrease from last year was participated in by all the sanitary districts; it occurred mostly in the winter months, but the midsummer mortality this year was unusually low.

The infant mortality is very low, almost 5,000 less than the average; the saving occurred in the autumn and in rural parts of the State. One-fourth of the deaths occurred under 5 years of age; deaths over 70 years of age ranged from 10 per cent in the maritime to 30 per cent in the central districts of the total.

The zymotic mortality was 14.0 per cent of the total, being above the average. Diarrheal diseases caused a very low summer mortality. Scarlet fever continues the abrupt increase of last year. Diphtheria has the same rate of the last four years which is very much less than all preceding years. Typhoid fever increased moderately in the maritime and Hudson valley districts.

Smallpox existed in the early months throughout the Adirondack region where it has not recurred save to a limited extent this present winter. During the year the disease has developed in 135 municipalities in all parts of the State, the chief of which have been New York city, towns in Westchester county, Albany, Schenectady, Binghamton and southern border counties, Walton in Delaware county, Rochester, Buffalo, and towns in Chautauqua county. It was most prevalent during the first half of the year, with much decrease in the summer and recurrence during the fall. It caused the same mortality as in 1901, but was more extensively prevalent. It exists now at Rochester and vicinity, abating; and in towns in Clinton, Chautauqua and Delaware counties.

There were 8,800 deaths from pneumonia and about 5,500 from Bright's disease. The acute respiratory mortality was a little below the average. Grippe was estimated to cause 1,000 deaths in the early months of the year. Its annual recurrence in November and December has been moderate causing probably not more than 500 deaths.

ANTITOXIN LABORATORY

Antitoxin Laboratory

January **15, 1903**

aniel Lewis, *Commissioner of Health, State Department of*
ealth, Albany, N. Y.:

**ar Sir—I have the honor to herewith report upon the work
ed on in the Antitoxin Laboratory during the year nineteen
red and two. In submitting this, the second report since the
uration of the work, I desire to recall that the first report,
nted at a time when the first appropriation had been avail-
but three months, dealt necessarily only with the actual es-
hment of the work. The laboratory work had been assigned
ecially prepared quarters in the Bender Hygienic Laboratory,
the procedures requiring the use of large animals had been
ged for by the purchase and remodeling of a stable located
by. After a year's experience under these conditions, the
r desires to repeat his statement of last year that these ar-
ements are eminently satisfactory and convenient for the
in hand at present.**

**e permanent staff of the laboratory remains the same with
ddition of Miss Ida H. Lindsay as clerk, and a change in the
ion of stableman from C. S. Markham, who resigned July 1st,
. L. Kelly.**

**the first report the general plan for the prosecution of the
was outlined, and may be briefly summarized as follows:
, the establishment of those portions of the work which have
ore practical bearing, and secondly the development of such
rch work on kindred problems as the time and resources
med by the former operations permitted. As was there dis-
d, the most practical field for work seemed to consist in the
uction and distribution of diphtheria antitoxin for the use
of State institutions, and secondly of other charitable and
olent institutions located in the State, and finally for the**

treatment and protection of persons financially unable to obtain the remedy from other sources.

It was to this work, therefore, that the larger part of the energies of the laboratory were first directed, and at the time the former report was presented the work of immunizing the horses was well under way.

The first supply of diphtheria antitoxin was sent out from the laboratory on the 19th of February. It consisted of seventy bottles of fifteen hundred units each, and was forwarded to the Willard State Hospital, where diphtheria has been present more or less continuously for several years.

About the middle of March the laboratory began the task of sending out to the health officers of all the cities, villages and towns in the State copies of the following circular, announcing the fact that the Department was in a position to furnish diphtheria antitoxin under the prescribed regulations:

DANIEL LEWIS, M. D.
Commissioner

H. D. PEASE, M. D.
Director Antitoxin Laboratory

NEW YORK
STATE DEPARTMENT OF HEALTH
ALBANY

DIPHTHERIA ANTITOXIN

The State Department of Health now furnishes Diphtheria Antitoxin, prepared and tested in its Antitoxin laboratory, under the following regulations:

It is to be supplied for the treatment or immunization of any of the following persons:

Inmates of state institutions.

Inmates of other charitable institutions located in New York state.

Persons residing in this state unable to purchase the remedy.

Antitoxin prepared and distributed by this Department is not to be sold under any circumstances, and a violation of the above prescribed rules will subject the violator to the penalty provided by section 397 of the Penal Code, which is as follows:

"A person who wilfully violates any provision of the health laws, the punishment for violating which is not otherwise prescribed by those laws, or by this code; and a person who wilfully violates or refuses or omits to comply with any lawful order or regulation, * * * made or established by any public officer under authority of the health laws, is punishable by imprisonment not exceeding one year, or a fine not exceeding two thousand dollars, or by both."

Physicians obtaining antitoxin for use as above noted, must agree to report the results from its use on the proper blank.

Those entitled to receive the remedy under the above schedule should apply as follows:

State institutions, to the State Department of Health, Albany.

All others to the health officer of the city, town or village where they are located or reside.

The serum is distributed in vials containing 1500 and 2500 units of antitoxin in volumes of about five and ten cubic centimetres respectively.

The actual volume of serum in the vials may be reduced from time to time, without any decrease in the number of units of antitoxin.

The vials will always be labeled in such a manner as to clearly show the number of antitoxic units contained in the full volume of serum present.

Dosage for Treatment. The dose recommended varies with the severity of the case, and especially with the day of the disease on which the antitoxin is first administered. *The earlier the remedy is used, the more favorable are the results obtained.*

In mild cases where the serum is administered within 24 hours of the onset of the disease, the initial dose should be not less than 1500 units, and should be repeated every eight hours until most marked and decided improvement results.

In severe cases where the serum is administered within 36 hours of the onset of the disease 2500 or 3000 units should be the dose employed, and repeated in the same manner.

In the very severe cases, especially in croup, and when the treatment is not begun until after 36 hours of the onset of the disease, the dose should be from 3000 to 5000 units. In these cases, as in the others, the injections should be repeated every eight hours, until there is not the slightest doubt of a complete convalescence.

Dose of Immunization. Three to five hundred units of antitoxin should be injected into any child or adult who has been exposed to diphtheria. Such individual will then be protected from the disease with almost absolute certainty for a period of from three to four weeks.

Mode of Administration. The serum should be administered by hypodermic injections made deeply into a portion of the anterior surface of the body where there is ample subcutaneous cellular tissue.

The skin over the selected region should be thoroughly cleaned with soap and water, and then washed with alcohol or some disinfecting solution. The syringe should be large enough to contain the dose to be given (except where excessively large doses are used), and should be thoroughly sterilized. Boiling for a few minutes is the best method.

Cases in which diphtheria is suspected, and in croup antitoxin should be administered at once and a culture taken from the affected region for bacteriological diagnosis.

With the circular was also forwarded a book of application and physicians receipt blanks. On the cover of this were directions for making out such applications, and for obtaining the receipts from physicians desiring to use the remedy in the proper cases. These books have since been modified, and the following forms constitute one of the new books now in use. The application blank in the old form was on the reverse side of the detachable physician's receipt, but in the new has been placed on a separate card, constituting an independent requisition.

On the cover of the book appears the following:

DANIEL LEWIS, M. D.
Commissioner

H. D. PEASE, M. D.
Director Antitoxin Laboratory

NEW YORK STATE DEPARTMENT OF HEALTH, ALBANY

REGULATIONS FOR THE DISTRIBUTION OF DIPHTHERIA ANTITOXIN

Diphtheria antitoxin is supplied for the treatment or immunization of the following persons: Inmates of state institutions; inmates of charitable institutions; individuals residing in this state unable to purchase the remedy in the amounts needed.

Antitoxin prepared by the State Department of Health is not to be sold under any circumstances.

Health officers and the heads of state institutions needing antitoxin at any time should send to the State Department of Health, Albany, one of the requisition cards filled in and signed, the same to serve as a receipt and an acceptance by the applicant of all the regulations concerning the distribution of the antitoxin.

Applications by telegraph and telephone will be accepted with the understanding that the properly filled in requisition will be forwarded by mail at once.

Health officers will be permitted to keep on hand a stock of antitoxin.

Physicians applying to local health officer for antitoxin must fill in and sign the receipt on the enclosed detached blank. The receipts must be returned promptly to the State Department in order that the latter may know at all times the stock on hand with each health officer.

Records of the receipt and distribution of the bottles should be made on the stub of the book. These are to be retained by the health officer.

The physician's reports on the results obtained by the use of the antitoxin must be sent to the State Department by the health officer promptly.

Fresh supplies will not be sent to health officers who neglect to forward the receipts and reports to the Department.

Directions for using and a report blank will be found with each bottle.

The inside of the cover reads as follows:

SPECIAL NOTICE

Diphtheria Antitoxin serum should be kept in a *cool dark* place. It will then retain its antitoxic strength for at least six months. It will not deteriorate during an indefinite period other than a gradual loss of strength. Health officers having diphtheria antitoxin on hand for six months should then make application for a fresh supply, and upon receipt of the same should return the old serum to the Antitoxin Laboratory, Lake Avenue, Albany, N. Y.

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	1,500 units	2,500 units
On hand from last record		
Received since last record		
Total now on hand		
Delivered to. . . . . .M. D.		
Bottles left in stock		

Forwarded to Albany

Receipts on . . . .

Reports of results on. . . . .

Form 72a

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Received from. . . . . , Health Officer of . . . . , County of. . . . . , N. Y. . . . . . . .bottles of 1500 units and. . . . . . .bottles of 2500 units of diphtheria antitoxin prepared by the New York State Department of Health.

I agree to report to the above the results of the use of said antitoxin on the proper blank. I do also certify that neither the persons to be treated nor their guardians are able to purchase the amount of antitoxin needed.

(Signed). . . . . .M. D.

Address . . . .

Stub and detachable physician's receipt.

Requisition for Diphtheria Antitoxin of the Health Officer of the...........of...........County of...............N. Y.
(Insert City, Town or Village)

State Department of Health, ...190
Albany, N. Y.

I have now on hand......bottles of 1500 units and......of 2500 units of Diphtheria Antitoxin.

Kindly forward to me......bottles of 1500 units and......of 2500 units to replenish my stock.

Enclosed are the receipts for the bottles distributed since my last report, and the reports on the results, which have been returned to me.

..................................M. D.

P. O. Address...

Form 87 b4782

Requisition for Diphtheria Antitoxin.

Copies of the circular, together with an outline of the objects of the work, were given to representatives of the press, and were widely published. It was supposed that these methods of notifying the health officers of the intended distribution would be generally effective, but it has since been learned that a large number of them failed either to receive the circulars or to appreciate the nature of their contents when received. However, the health officers of the larger cities and villages, and many others throughout the state, made immediate requests for the antitoxin, and as the work of the laboratory became more and more widely known applications were received from even larger numbers of health officers from all parts of the State.

The beginning of the general distribution of this remedy can be stated as the last of March, but the work of the laboratory did not become generally known until the latter part of the year.

From the last of March to the 1st of January, 1903, applications were received from the health officers of 30 cities, 161 villages and 171 towns located in 57 counties in the state. Diphtheria antitoxin has, therefore, been furnished to an average of over six localities in each county of the state, excluding those constituting Greater New York, which has its own antitoxin laboratory. Applications from health officers not yet supplied are being received daily, and as the appearance of the disease and an appreciation of the value of the work increases, the number of health officers making use of the Department's antitoxin will undoubtedly be greatly augmented.

To these localities and to state institutions the laboratory has forwarded during nine months the equivalent of 6552 bottles, each containing 1500 units of antitoxin. Of this amount the equivalent of 3016 bottles were sent out during the last three months, or on an average of 1000 bottles a month for that period. The average strength of the serum distributed was 300 antitoxic units per cubic centimetre.

As has already been said some of the State institutions were the first to be supplied with antitoxin. In the Willard State Hospital diphtheria has been a matter of considerable concern since 1897. In the report of the Commission in Lunacy for the year ending September 30, 1901, it is stated that there had been 132 cases of diphtheria from June, 1899, up to the end of the period covered by that report, and the disease has persisted since that time. Through the kindness of the secretary of the Commission, Mr. T. E. McGarr, I am able to quote from the conclusions in a report of a committee of experts appointed to investigate the sanitary condition of the hospital, with especial reference to the presence of diphtheria: "We consider that in combating the disease the authorities of the hospital have met with all the success that could be expected under the circumstances. In view of the fact that they as well as the patients are living in buildings infested with bacillus diphtheria their task is almost a hopeless one." With such a state of affairs existing it was but natural that the work of this laboratory would be of considerable value to the hospital authorities. The possibility of obtaining as much diphtheria antitoxin as might be necessary without regard to the expense involved was doubtless attractive, for an application for a large amount of antitoxin was sent by them to us before the horses were furnishing serum of a grade useful for treatment. This institution has received from February 19, 1902, to January 1, 1903, the equivalent of 657 bottles, each of 1500 units, of diphtheria antitoxin, and has thus been next to the largest single user of the state product. At the present writing the institution is receiving a regular supply of 100,000 units every month, which is used for immunizing purposes, as there are no actual cases of disease now present in the institution. Altogether about 1300 persons in this institution have been protected from the disease by the use of immunizing doses of the state antitoxin, and in none has the disease developed.

The second institution to receive the benefits derived from the establishment of this laboratory was the Craig Colony for Epileptics at Sonyea. Altogether this institution has received the equivalent of 87 bottles, each of 1500 units of antitoxin since March 14, 1902. Two cases of diphtheria developed in the Colony at that time, and were promptly treated with large doses of the state's antitoxin, and were practically well within 48 hours. The medical superintendent, Dr. W. P. Spratling, has written as follows: "One hundred and sixty-six patients and employees who had been exposed to the disease were immunized with your antitoxin—and no one so immunized contracted the disease. There were no unfavorable effects from the use of the antitoxin in these cases and altogether our experience with this preparation has been very satisfactory." What might have been a serious epidemic of diphtheria was thus absolutely prevented by the prompt and extensive use of antitoxin obtained from this laboratory.

A similar experience on a smaller scale occurred in the Binghamton State Hospital where three cases developed and were promptly treated. Four nurses were successfully immunized. Dr. Charles S. Wagner, the medical superintendent, further states: "In our diphtheria cases the injections were entirely satisfactory and all three of the cases made a prompt recovery. We have had no outbreak of the disease since that time."

Similar small epidemics were controlled in the State Industrial School at Rochester, and the State Institute for Feeble-Minded Children in Syracuse, by the use of the Department's antitoxin.

The most extensive use of the State antitoxin has been made by the authorities of the Utica State Hospital. Antitoxin was first supplied to them in August, and from that time until January 1st the equivalent of 704 bottles of 1500 units each have been forwarded to them. This large amount was necessitated by the desire of the superintendent early in November to endeavor to check the epidemic which had existed up to that time, and accordingly the entire population was immunized. In all, their reports show that 1394 persons have been protected from diphtheria by the use of the state antitoxin, and that 1291 of these were so treated during a period of a few days. The writer does not know of any instance in this country where so many persons have been immunized with diphtheria antitoxin at any one time and place. This extensive undertaking was eminently successful, in that with but one exception none of these persons contracted diphtheria within a period of a month, and that case in a nurse was very mild in character; and only one other had an attack of the disease within seven weeks, and this was also a mild case. Thirty-six other persons, thirty-three of whom were shown to have diphtheria, were treated with the state antitoxin, and of these but two failed to recover. These two fatal cases will be considered later, along with all such which have been reported. It is sufficient to say here that the death of both of them was to have been expected owing to the intervention of other complicating diseases. Concerning the results obtained the medical superintendent, Dr. H. L. Palmer, says in part: "There have been no pronounced symptoms from small doses and we have been remarkably free from complications of any kind. Most of the cases have been mild, which in all probability was due to the fact that they received antitoxin early. There have been but two deaths."

It is at present too early to estimate what the ultimate effect on the epidemic the immunization of the entire hospital population will have, but it cannot fail to render the disease, if it recurs, of a milder character, and without question the number of cases occurring will be far smaller than if no such operation had been resorted to.

The amount of diphtheria antitoxin distributed to the State institutions already mentioned would be represented by 1500 bottles, each of 1500 units, which represents a retail valuation of over $3000. However, the benefits derived by the state institutions from the production of this antitoxin by this Department are not fairly represented by the retail valuation of the antitoxin. Its production by this Department permits the prompt filling of orders of almost any amount on the very shortest notice, and in such a manner as best suits the conditions under which the remedy will be used. These considerations are of the greatest value, as they place any of the state institutions in a position to at once suppress an epidemic of diphtheria before it is fairly under way, thus making it possible not only to protect from disease and possible death its inmates and employees, but also to avoid to a large extent the trouble and expense always incident to an epidemic of any kind. A delay in obtaining from a distance from other sources enough antitoxin to treat those ill, and protect all those who have been exposed to the disease, would probably permit an epidemic to gain a foothold. Therefore, all the state institutions have been and are encouraged to keep supplies of the antitoxin on hand so as to promptly check the disease should it appear, and if more is needed such emergency supplies allow sufficient time for an application for a larger amount to be made to this Department, and forwarded by it to them. The provision of a large supply of antitoxin for free use in state institutions not only relieves them of the expense of the antitoxin, but avoids the great financial outlay and serious trouble and annoyance brought about by epidemics.

Other charitable institutions in the state have made excellent use of the advantages afforded by the laboratory work.

One of the first of these was the Children's Home of Amsterdam. An epidemic occurred, during which there were six cases of diphtheria treated and twenty children immunized. All recovered, and no new cases developed.

A similar epidemic occurred in the Woman's and Children's Hospital in Syracuse, with three cases treated and seventeen persons protected from the disease with state antitoxin.

Similar epidemics have been successfully stopped in their course in the Albany Orphan Asylum, Child's Hospital and St. Margaret's House, in Albany, and antitoxin has been used for immunizing purposes in thirty-six persons in the Erie County Hospital, Buffalo, and considerable amounts for both treatment and prevention have been used in the Buffalo General and Sisters' hospitals of Buffalo, and the City hospitals of Syracuse, Binghamton and other cities of the State.

The number of small epidemics and individual cases treated with the state antitoxin cannot be stated nor estimated, inasmuch s but few of the physicians using it have returned the report lanks accompanying each bottle properly filled in. This failure n their part is in harmony with the experience of other laboraories doing similar work. These incomplete returns show that 08 cases of diphtheria were treated, and over 3000 additional well persons were protected from the disease by means of the tate antitoxin. Of these 608 cases the reports were incomplete n that the final result was not stated in 61, and bacteriological xamination showed that 23 more were not diphtheria. Of the 15 remaining cases, a positive bacteriological diagnosis was reorded in 244, although clinically all the cases were diphtheria. f the former 177 cases, four ended fatally, and of the latter 244 ases 31 did not recover. Two of the 23 cases shown not to be iphtheria also died.

Of the 515 cases there were, therefore, 35 deaths, a fatality of .7 per cent. However, these figures are open to objection in that hey may not represent the true proportion of deaths to cases in ll those treated with the state serum. It would be necessary in hat case to suppose that a tendency existed to report more reoveries than deaths, or vice versa. It would be difficult to deermine the proper opinion to hold on that question, but the writer inclined to believe that no stronger tendency exists in one diection than in the other.

The most valuable use to which these statistics may be put, in y opinion, would be a critical investigation of the circumstances rrounding the cases ending fatally.

Of the two deaths occurring in the 23 cases shown not to be diphtheria by bacteriological examination little need be said. In one the case was definitely shown by subsequent clinical examination not to be diphtheria.

Of the other 33 deaths the following arrangement into groups may be advantageously made.

Reports from nine cases either state definitely or show very clearly that the persons treated were in a moribund condition when first injected, as is shown by the following table:

Case number	Bacteriological diagnosis	Type of the disease	Day of disease first injected	Number of injections and amount of each	Remarks and time of death after last injection
6b...	Not stated.	Laryngeal.	2+	1 of 2,500 Units.	Intubation. Far gone at time of injection.
15b..	“ .	“ .	4.	1 of 4,000 “ .	Death in 12 hours.
19...	“ .	Not stated.	3+	1 of 2,500 “ .	Far gone. Death in 6 hours.
22...	“ .	Laryngeal.	?	1 of 4,000 “ .	Moribund when seen.
92a..	“ .	“	1+	1 of 2,500 “ .	Patient insane and maniacal. Died in 6 hrs.
100a.	“ .	Not stated.	6	1 of 4,500 “ .	Heart failure. Died in 4 hours.
100b.	“ .	Laryngeal.	2+	1 of 2,500 “ .	Heart failure. Died in 8 hours.
208..	Positive...	Not stated.	4	1 of 2,000 “ .	Moribund. Died in 1 hour.
2....	Not stated.	Laryngeal.	2?	2,000 Units.....	Died in 8 hours.

These represent the most hopeless class of cases, and it may have been too much to expect any of them to have recovered. However, much larger doses of antitoxin would have been advisable in all of them.

Another natural group is of seven cases in which the reports show that the first injection of antitoxin was not given until the third day of the disease or later.

Case number	Bacteriological diagnosis	Type of the disease	Day of disease first injected	Number of injections and amount of each	Time of death after last injection
4....	Not stated.	Laryngeal.	3d	1 of 3,000 Units...	?
6a...	Positive...	"	5th	1 of 3,000 " ...	2 days.
9....	Not stated.	"	4th	2 of 2,000 " .. 1 of 1,500 " ..	2 days.
13...	"	Not stated.	4th	2 of 1,500 "	?
130..	"	Laryngeal.	3d	1 of 2,500 "	1 day.
239..	"	"	4th	1 of 2,500 "	?
10...	"	"	4th	1 of 1,500 "	1 day.

Considering the fact that all but one of these were of the laryngeal type, and all were seen late in the course of the infection, none of them received the amounts of antitoxin which they needed.

Both of these groups show that there are many physicians of the state who need to learn the value of large doses of antitoxin in the treatment of diphtheria. Many of the physicians treating the cases included in these and the remaining groups have received a personal letter from the director of the laboratory, in which suggestions that the experience of others in the use of larger doses have given more favorable results have been made, and in several instances gratefully acknowledged.

There is a class of fatal cases in which the unfavorable results cannot be foreseen, but which could probably be avoided by the use of larger doses of antitoxin. These are cases of heart failure after apparent recovery. Of the thirty-three fatal cases seven were of this character, as shown by the following table:

Case number	Type of the disease	Day first injected	Number of injections and amount of each	Time of death after apparent recovery
13...	Nasal......	3d	5; total, 7,500 in 3 days.......	5 days.
14...	Not stated..	4th	1 of 2,500 Units.............	1 week.
27...	" ..	1st	1 of 2,500 "	1 week.
45...	Nasal......	2d	2 of 2,500 Units each in 2 days.	11 days.
72...	Pharyngeal.	2d	2 of 2,500 Units each in 2 days.	3 days after injection.
72...	Not stated..	1st	1 of 3,000 Units.............	12 days after injection.
168..	" ..	3d	5 of 2,500 Units each....... 2 of 3,000 Units each.......	1 week.

Another group consists of those fatal cases in which some other disease or serious condition not entirely, at least, attributable to the diphtherial infection was present. Of these there were five cases:

Case number	Type of the disease	Day first injected	Number of injections and amount of each	Complications	Remarks
72a..	Not stated.	1st	1 of 1,500......	Nephritis......	Died 9 days after injection.
72...	Laryngeal.	1st	2 of 2,500......	Uremia........	Died 5 days after last injection.
76...	" .	2d	1 of 1,500......	Measles........	Day of death (?).
92...	Diphtheria.	1st	4 of 2,500.... 2,500 .... 2,500 .... 5,000 .... 5,000	Insane........ Severe enteritis.	Death 2 days after last injection.
9....	" .	1st	2 of 1,000 each.	Previous malnutrition....	Died in 24 hours after last injection.

The remaining six cases form the last group. In two no details were reported. The other four without exception should have received larger doses:

Case number	Type of the disease	Day first injected	Number of infections and amount of each	Remarks
15....	Not stated..	2d	1 of 3,000 Units.....	Died in 24 hours.
122...	" ..	2d	1 of 3,000 "	Died in 30 hours.
192...	Laryngeal..	2d	1 of 2,500 "	Time of death (?).
80....	Not stated..	2d	1 of 2,500 "	Died in 4 days.

It would seem to be clear from the consideration of these cases that while the death rate in the whole number of cases reported upon was low, that there is still room for the improvement sure to follow the use of larger doses of the remedy. The laboratory will continue to make its influence felt towards a proper understanding of the great value of large doses of antitoxin in the treatment of diphtheria.

In the first annual report, and in a more recent official communication presented to the Department, I have treated of the general value of the treatment of diphtheria by the use of antitoxin, and it is not necessary to again cover that ground. It might be stated that nothing has appeared in any foreign or domestic publication indicating anything but a lowered death rate due to the use of this treatment.

As has already been stated while referring to the use of the laboratory's product in state institutions, a large amount of antitoxin has been used on healthy persons who had been exposed to diphtheria for the purpose of protecting them from infection with it. The number of reports from such use, which have been returned to the laboratory, is probably far from indicating the amount of antitoxin used for this purpose.

Reports have been received chiefly from state and other charitable institutions where records are more readily and thoroughly kept than is the case with physicians in private practice. In all, reports have been received indicating that 3024 persons, more or less directly exposed to infection with diphtheria bacilli, have been treated with immunizing injections of antitoxin. Of these but two developed diphtheria within four weeks. This is the length of time during which immunity is generally conferred by an injection of 500 units of antitoxin, which is the usual dose. Of these two cases, one developed diphtheria within 24 hours of the time when injected. This child must have been infected at the time of the injection, for the latter consisted of 1500 units of antitoxin, which is certainly a large enough dose to insure the protection of a healthy person for many days at least. The other case occurred in an inmate of the Utica State Hospital, who contracted the disease 25 days after an immunizing injection of 500 units.

Three other cases of diphtheria developed after immunizing doses of antitoxin, but after longer periods of time, varying from five and one-half to eight weeks. The immunity conferred by such injections is not expected to last over a period of four to six weeks, but there are certain persons in whom the excretion of the antitoxin takes place at a more rapid rate.

As has already been stated, the prevention of the spread of this disease by the use of protective doses of antitoxin is one of the most valuable features of the state production of the remedy. Health officers and other physicians, having cases of diphtheria in persons unable to purchase antitoxin, have in times past frequently bought a small amount of the remedy themselves, but it would have been too much to expect them to pay out their own money for the protection of exposed persons. Even charitable institutions, while willing to furnish the remedy for the treatment of the sick, have frequently hesitated and declined for financial reasons to protect those exposed to the disease. It is just here that the state production will be productive of far reaching benefit, for it is by this protective use of antitoxin that troublesome epidemics, often causing serious financial loss to a whole community, can be to a large extent prevented.

There can be no doubt that a very large proportion of those who have received either treatment or protection with the antitoxin produced by this laboratory would have been forced for financial reasons to go without such treatment if our antitoxin had not been available. The conditions in this state are probably quite similar to those in Massachusetts. There, after seven years of state production, during which time antitoxin has been distributed free to rich and poor alike, 50 health officers have variously estimated that from 50 to 100 per cent of the persons treated with their state antitoxin would have been forced to go without such treatment if that product had not been available. In New York state, where the remedy is supplied for use only on persons unable to purchase the remedy, it must be evident that all such persons who have or who may in the future be treated with it would not receive any antitoxin unless it was purchased with money from state or county funds, or by the physicians themselves. It would seem, therefore, as if the value and the propriety of this work was beyond question.

The second branch of the work to which the energies of the laboratory were directed was the production of antitoxin for tetanus or lockjaw. The procedures for the production of diphtheria antitoxin having been placed on a routine working basis in January, 1902, the work on tetanus was inaugurated.

The time needed to produce a strong tetanus antitoxin is much longer than in the case of the diphtheria remedy. While the procedures are in the main similar, many of the details require entirely different laboratory treatment. The time taken by the horses in producing the maximum strength of antitoxic properties in their blood, while varying with each horse, is uniformly much longer than in the case of diphtheria.

The first serum was obtained during the latter part of June, and tests of it showed it to be strong enough to be suitable for use in the treatment of cases of the disease. It seemed advisable to defer the general distribution of emergency supplies of this remedy until larger amounts of a stronger antitoxic serum were available. However, the amount on hand was sufficient to supply the cases needing it for treatment, and a special announcement was made in the Bulletin of the Department to the effect that the Department was prepared to furnish tetanus antitoxin for the treatment or prevention of the disease under the same conditions as surround the distribution of the diphtheria antitoxin, upon application to it by the proper persons. This announcement was also given to representatives of the press, and was widely published in all parts of the state. It also appeared in part in the weekly medical journals of the state and country.

In response to these announcements the laboratory was requested to supply antitoxin for the treatment of three cases, the histories of which will be considered later.

Having experienced some difficulty in getting supplies of the antitoxin to those needing it as soon as was desirable, the plan of having moderate supplies of it in the hands of a large majority of the health officers at all times was decided upon, and preparations for putting it into operation were made during October. The amount needed for such a distribution was available, and of a much greater potency than that previously obtained. It also seemed highly desirable to call attention to the valuable use of tetanus antitoxin as a means of preventing the disease, especially in connection with certain classes of injuries. Inasmuch as the prevention of the disease has been far more successful than the treatment of it, even under the very best of conditions, it was deemed advisable to distribute the supplies to be kept on hand by the health officer in the form of immunizing doses of ten cubic centimetres each. Copies of the following circular and requisition for tetanus antitoxin, together in many instances with a letter from the Department stating the reasons for this distribution, were therefore sent to all the health officers of the state. The lay and medical press also extensively copied the circular.

DANIEL LEWIS, M. D.
Commissioner

H. D. PEASE, M. D.
Director Antitoxin Laboratory

NEW YORK
STATE DEPARTMENT OF HEALTH
ALBANY

TETANUS ANTITOXIN

The State Department of Health now furnishes Tetanus Antitoxin, prepared and tested in its Antitoxin Laboratory, under the following regulations:

It is to be supplied for the treatment or immunization of any of the following persons:

Inmates of state institutions.

Inmates of other charitable institutions located in New York state.

Persons residing in this state unable to purchase or obtain the remedy.

Antitoxin prepared and distributed by this Department is not to be sold under any circumstances.

Physicians obtaining antitoxin for use as above noted, must agree to report the results from its use on the proper blank.

Those entitled to receive the remedy under the above schedule should apply as follows:

State institutions to the State Department of Health, Albany.

All others to the health officer of the city, town or village where they are located or reside.

The serum will be distributed in two forms. Small vials containing ten cubic centimetres will be sent out for use as a preventive or immunizing agent. Larger bottles containing from fifty to several hundred cubic centimetres, intended for the treatment of cases of tetanus, will be forwarded upon application by letter, telegraph or telephone to the Antitoxin Laboratory, State Department of Health, Albany.

Treatment with Antitoxin. This must be begun early. Very favorable results can hardly be expected unless the primary injection of antitoxin is made within thirty-six hours after the onset of the symptoms. By the time the first symptoms appear the disease is usually well advanced. Treatment is then directed toward preventing further injury. The antitoxin may be administered in several ways:

(*a*) Subcutaneously. In order to begin the treatment early the contents of two or more bottles, intended for immunization, should be the amount used for the first injection. Application for a larger amount should be made and doses of fifty cubic centimetres or more should be given every eight hours until decided improvement results.

(*b*) Intravenously. The amounts just mentioned may be given intravenously. Where surgical intervention is possible large amounts, up to 500 cubic centimetres, may be given in one dose in this manner. The serum should be heated to one degree above the rectal temperature, and should be injected slowly.

(*c*) Direct injection into the nervous system. Small amounts may be injected directly into the frontal lobe or lateral ventricles of the cerebrum, or a lumbar puncture may be made, and after the withdrawal of ten cubic centimetres of cerebro-spinal fluid five cubic centimetres of antitoxin should be injected. Whether these intracerebral and intraspinal injections have any advantage over the subcutaneous or intravenous injections remains to be demonstrated.

Immunization. Recent results go to show that the subcutaneous injection of an immunizing dose of tetanus antitoxin is a sure method of preventing the disease. In all cases where garden dirt, stable dust, manure, paper wads or powder from cartridges have been ground or forced into the injured tissues, a preventive dose of tetanus antitoxin should be given subcutaneously at the time the wound is dressed, or as soon after as is possible. This is especially recommended where cases with injuries of this kind occur in parts of the state in which tetanus has often followed similar wounds in the past.

Mode of Administration. The serum if given subcutaneously should be administered by hypodermic injections made deeply into a portion of the anterior surface of the body where there is ample subcutaneous cellular tissue.

This skin over the selected region should be thoroughly cleansed with soap and water, and then washed with alcohol or some disinfecting solution. The syringe should be thoroughly sterilised. Boiling for a few minutes is the best method. Where large doses are given intravenously, or injections are made into the nervous system, a strictly aseptic surgical technique should be observed.

Requisition for Tetanus Antitoxin of the Health Officer of the

..............of...............County of...............N. Y.

(Insert City, Town or Village)

State Department of Health, ...190
Albany, N. Y.

I have now on hand......immunizing doses of ten c. c. of Tetanus Antitoxin. Kindly forward to me......bottles of the same for a new stock.

(Use space below for request for Tetanus Antitoxin for treatment. State amount needed or whether for subcutaneous, intravenous, subdural or intracerebral injections.)

....................................M. D.

P. O. Address...

Form 86 b4781

The response to these notices was prompt and gave strong evidence of how valuable the distribution would be to those treating cases of the disease, and also in its use as an immunizing agent. During the months of November and December antitoxin equivalent to 900 bottles, each containing one immunizing dose, were forwarded in all to 181 health officers located in one or more places in every county of the state outside of those comprising Greater New York. Requests from other health officers are still coming in, and as the value of such supplies becomes more and more appreciated the number will be greatly increased. During these two months tetanus antitoxin for the treatment of two cases was also sent out by the laboratory. One of these was afterwards determined not to be tetanus. In all, therefore, the laboratory's product has been used in the treatment of four cases of tetanus.

It is hardly necessary to go into all the details of the histories of each case. In the first two, one in Albany and the other in Broadalbin, the disease was the result of toy pistol wounds. Both were very severe acute cases, and ended fatally within 48 hours of the onset of the symptoms, notwithstanding the injection of 260 c. c. of tetanus antitoxin in the former, and 60 c. c. in the latter case.

The third case was of a more chronic type. The onset of the symptoms was delayed until 12 days after the injury. Antitoxin was not injected until three days later. In all about 250 c. c. were injected during the following 48 hours, and was then discontinued, as the surgeon in charge thought the injections aggravated the symptoms. The disease gradually increased in severity and the patient died five days after the discontinuance of the injections of antitoxin. This case was a favorable one for the antitoxin treatment, and might have recovered if the injections of antitoxin had been continued. The temporary increase in the symptoms after an injection is due to the disturbance of the patient, unavoidable in performing such an operation, but it is not significant, for the antitoxin treatment is not expected to relieve the symptoms present when it is given, but is directed towards the prevention of the more serious symptoms sure to develop later on if no treatment is given.

The fourth case indicated that in properly large doses good results may be expected in the treatment of this same class of cases. In this case which was treated within 24 hours of the onset of the symptoms, which occurred on the thirteenth day after the injury, the primary symptoms although unmistakable were not severe. Within the next 36 hours 560 c. c. of the laboratory's tetanus antitoxin had been administered. Of this 250 c. c. had been injected intravenously and the remaining amount subcutaneously. The effect of these injections was the lessening of the tetanic symptoms, but the patient contracted pneumonia and died after another 24 hours. Without the intervention of another complicating disease this case belonged in the class of those that stand an excellent chance of recovery under the serum treatment. The improvement in the tetanus symptoms in this case indicates what has been positively demonstrated in numbers of instances by others, and that is to obtain any favorable effect the remedy must be used early, and in large amounts, frequently repeated. This can only be accomplished under conditions where some of the remedy is constantly at hand, and one of the most valuable features of the work of this laboratory is that it permits the keeping of supplies by every health officer to be used as a primary injection, and thus giving them time to receive further supplies from the laboratory.

Heretofore it has not been possible to obtain any tetanus antitoxin in any but the larger cities, and a few villages, and even now the amounts obtainable of serum other than that supplied by this Department would be far too small to expect much benefit to be obtained from their use in the treatment of a case of the disease.

That tetanus is not as uncommon as is frequently supposed, it may be stated that during the months of July, August and September there were 29 deaths stated as due to the disease reported to the State Department of Health. This does not include any deaths which may have occurred during that period in New York, Yonkers, Buffalo and Albany. The United States census for 1900 gives the number of deaths from tetanus in this state during that year as 147. Of these, 84 occurred outside of New York city.

The disease occurs in all parts of the state, as is shown by the fact that the 29 deaths mentioned above occurred in 26 counties, and the 84 deaths in 1900 were widely distributed over the entire state.

When one considers that the disease in all of these cases could have been prevented by the subcutaneous injection of only ten cubic centimetres of antitoxin at the time the wounds were treated, it is surprising that this use of the remedy is not more often resorted to. As a part of the routine treatment of such injuries as are frequently followed by the disease the subcutaneous injection of a preventive dose of antitoxin would be a most simple and inexpensive matter, resulting in no harm whatever, and making it practically certain that the disease would not develop.

The distribution of the antitoxin [illegible] by the Department, together with the information which has been sent out in the form of the circulars and a [illegible] on the subject by the director of the laboratory published in the Bulletin of the Department, will go far towards encouraging physicians and surgeons to make such use of tetanus antitoxin.

The director of the laboratory has in his previous report, and more recently in a paper presented to the Conference of State Sanitary Officers,* considered the problems involved in the treatment of tetanus with antitoxin, and also the published results obtained by the use of the remedy for the treatment and prevention of the disease. These points need not, therefore, be discussed at this time except to state that statistics indicate that a definite though comparatively small lessening of the mortality in tetanus has occurred through the use of antitoxin for treatment, and that absolute protection can be obtained by its use as a preventive agent.

All statistics concerning the results of the use of tetanus antitoxin are open to the serious objection that the amounts of antitoxin used are expressed in cubic centimetres of the serum containing the antitoxic principles, and no statements are made concerning the antitoxic strength of such sera. This is due to the fact that no unit of antitoxic strength has ever been generally accepted as a means of expressing the antitoxic value of tetanus antitoxic serum. There are several technical difficulties in the way of preparing a standard which could be generally applied for making such tests which have yet to be overcome. A definite arbitrary unit and a standard method of determining it are, however, badly needed, and work directed towards obtaining data on this subject has been undertaken during the year.

Another feature of the laboratory work, which in due time can be placed on a routine basis, is the examination of samples of diphtheria antitoxin purchased in the open market for the purpose of ascertaining whether the quality and strength are as represented, and also whether such sera are free from injurious and harmful properties.

The director has already tested samples of diphtheria antitoxin prepared by four institutions making a business of selling this remedy in this state. The test applied was that regularly used in the determination of the antitoxic strength of the serum sent out by this laboratory. The results obtained showed that none of the samples would have been sent out from this laboratory claiming the strength marked on their labels. Some fell but slightly below the standard as here applied, while others were still weaker. The indication from these tests is that the test applied here is somewhat more severe than that employed in other antitoxin laboratories.

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* Proceedings of the Conference of State Sanitary Officers.

It is highly desirable that the so-called unit of diphtheria antitoxin should be as near as possible a fixed standard, and that the method of testing for the unit strength of antitoxic sera should be uniform in all laboratories.

Recently two committees having the power to consider these points, and make recommendations concerning them, have been appointed; one by the Committee on Revision of the United States Pharmacopœia, and the other by the Laboratory Section of the American Public Health Association. The director of the laboratory is a member of both. It is hoped that the deliberations of one or both will result in a definite standard test which can be uniformly used by all laboratories, and thus permit the establishment of the routine work of testing samples of the products exposed for sale in this state.

Throughout the year, and especially during the months of July and August, research work especially directed towards ascertaining the nature of the antitoxic elements in diphtheria and tetanus antitoxic sera was carried on. In connection with it work on the isolation of the essentially toxic constituents of tetanus toxic bouillon was also inaugurated. This latter work is preliminary to an endeavor to produce a stronger tetanus antitoxin, and in any event will be productive of data which will assist in the determination of a standard method of testing the strength of such antitoxic sera. For assisting in this work the laboratory temporarily employed E. C. Schneider, Ph. D., Professor of Biology of Tabor College, Iowa, who has had an unusual training in both biology and bacteriology, especially fitting him for assisting in such work.

In the report of last year reference was made to the status of the work on the production of an effective antitoxin for streptococcus infections. During the past year much work has been carried on, especially in Europe, concerning the specificity of different groups of streptococci. If the results of Meyer,[1] Piorkowski,[2] and others are finally substantiated it will be possible to eradicate one stumbling block in the way of the preparation and use of antistreptococcic serum, namely, the uncertainty of the relationship between the streptococcus used to produce the immune serum and that infecting the patient. According to these authors distinct groups of streptococci exist and the immune serum produced by the injection of animals with an organism from one group will not produce agglutinative reactions in the proper dilutions when mixed with streptococci from another group.

Moser, in Austria, and Charlton, in Montreal, have recently treated cases of scarlet fever with a serum prepared with streptococci obtained from the heart's blood, or other tissues of the body, from fatal cases of that disease. Their idea is not that the streptococcus found in such cases is the cause of scarlet fever, but that it is a complicating infection and produces many of the serious symptoms associated with the disease. The good results claimed by them have as yet been obtained in the treatment of too small a number of cases to warrant any infinite opinion as to the ultimate value of this treatment. But the work, however, is of considerable interest.

While much work has been done throughout the world, and something accomplished towards the final explanation of the problems of infection and immunity in typhoid fever, tuberculosis and kindred diseases, no results looking towards a practical specific serum treatment of these diseases have yet been obtained.

The work of the laboratory has, therefore, three important aspects: sanitary, charitable and educational. All are so blended and interdependent that it is difficult to determine which is the more important. The sanitary or public health work consists in the prevention of certain infectious diseases, and the treatment of them in such a manner as to avoid their becoming epidemic in character. The charitable work consists in supplying a scientifically produced remedy, in quantities which permit certainty of the best results, to the unfortunate citizens of the state needing it, but who would in 90 per cent of the cases go without it if not supplied by the system of state distribution.

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[1] Die Agglutination der Streptococcus. F. Meyer. Deutsche Medicin. Wochen. 16 October, 1902.

[2] Ueber Streptokokkensera. Piorkowski. Centralblatt für Bakt. Erste Abt. Originale Bd. XXXII, No. 2. Also Berliner Klin. Wochen. No. 48, 1902.

The educational feature is brought about by the contact of health officers and physicians with those working in one special field of scientific work, and more especially by the valuable experience gained by some of the health officers and physicians through the demonstration of the great value of the use of properly large doses in the treatment of both diphtheria and tetanus with antitoxin. The habit of using small doses, so prevalent with a large number of physicians, is attributable to the high cost of these remedies far more than to any other one cause. State distribution in thus bringing about a needed change of sentiment on this subject is benefiting more than those on whom its product is used.

I desire in closing to acknowledge my appreciation of the continuance of the interested and helpful attitude towards the work of the laboratory, which pleasantly marked your reception of it last year as a part of your department.

Respectfully submitted,
H. D. PEASE,
Director, Antitoxin Laboratory

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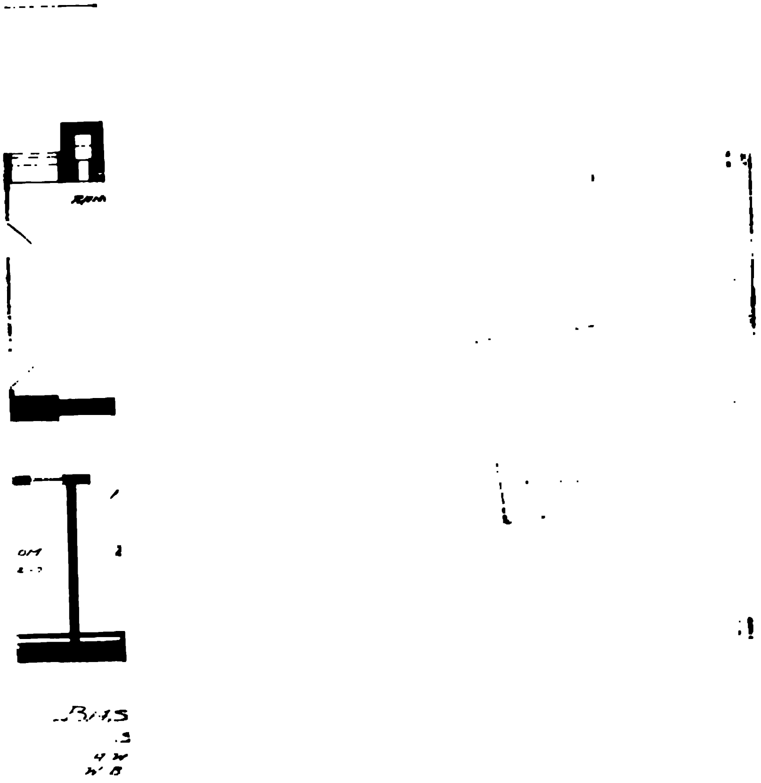

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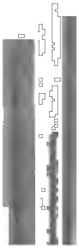

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